

ANNUAL REPORT
OF THE
INDIAN CENTRAL COTTON COMMITTEE,
BOMBAY,
FOR THE
YEAR ENDING 31st AUGUST
1936.

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Annual Report of the Indian Central Cotton Committee for the year ending 31st August 1936.

CHAPTER I.

As a result of one of the recommendations of the Indian Cotton Committee of 1917-18, the Indian Central Cotton Committee was constituted by the Government of India in the Department of Revenue and Agriculture, in their Resolution No 404-22, dated the 31st March 1921. Originally its functions were purely of an advisory character but with its incorporation under the Indian Cotton Cess Act in 1923, the Committee became an administrative body having at its disposal funds "for the improvement and development of the growing, marketing and manufacture of cotton in India." The Committee thus exercises its functions in a dual capacity. Firstly, it advises the Government of India, local Governments and Indian States on subjects connected with the growing and marketing of cotton and brings to their notice matters which, in its opinion, require attention. Secondly, it provides funds for research into cotton problems of an All India character. Cotton is an important crop, and improved varieties of cotton. The work has passed the experimental stage as will be seen in Chapters IV and V of this report.

The Committee also serves as a common meeting ground for all branches of the cotton industry, since all the main interests associated with cotton, viz, the grower, the ginner, the exporter, the millowner and the agricultural expert are represented on it. Whilst the Committee's constitution thus ensures a broad outlook on the many problems affecting the cotton industry, its primary concern is the interest and welfare of the cotton grower.

PERSONNEL

2 In *Appendix I* will be found a list of members of the Committee as it stood on the 31st August 1936. Under the Indian Cotton Cess Rules, members who are not *ex officio* members, hold office for three years and one third of their number retire each year in rotation.

Dr F J F Shaw, CIE, I.A.S., Offg. Agricultural Expert to the Imperial Council of Agricultural Research and an *ex officio* member of the Committee, died during the year and the Committee, at its meeting in August 1936, recorded its appreciation of the services rendered by him not only to the Committee but also to the country as a whole.

SUB COMMITTEES

3 Most of the detailed work of the Committee is carried on by means of Sub Committees and thereby much of its time is saved at its half yearly meetings. The Committee is greatly indebted to the members of the various Sub Committees for their invaluable assistance and hearty co-operation in furthering the work of the Committee, more particularly are its thanks due to the members of the Standing Finance and Local Sub Committees who are required to attend to the business of the Committee at more frequent intervals.

The functions of the various Sub Committees are detailed below and their composition as on the 31st August 1936 is given in *Appendix II*.

(a) *The Standing Finance Sub Committee* is a statutory Sub-Committee and is the principal executive body of the Committee. By a resolution of the Committee one of the members of this Sub Committee must be a representative of cotton growers. Eight meetings of this Sub-Committee were held during the year.

(b) *The Local Sub Committee* deals with matters not involving finance, which cannot be dealt with at the half yearly meetings of the full Committee. Eight meetings of this Sub Committee were held during the year.

(c) *The Cotton Ginning and Pressing Factories Sub Committee* is appointed by statute to deal with matters arising out of the Cotton Ginning and Pressing Factories Act of 1925. This Sub Committee did not meet during the year. The more routine work of this Sub Committee was disposed of by the Local Sub Committee.

(d) *The Agricultural Research Sub Committee* ordinarily assembles half yearly during the meetings of the full Committee. It reports on the progress made on schemes financed by the Committee, examines proposals for new schemes or extensions of those already in operation and considers the reports of research students.

(e) *The Research Students Selection Sub Committee*, as its name implies, selects students to whom scholarships or training grants are awarded for the purpose of undergoing training in research in the several sciences relating to cotton. One meeting of this Sub-Committee took place during the year.

(g) *The Sub Committee on Malpractices* was originally formed with the object of dealing with all references concerning abuses and malpractices in regard to Indian cotton. As it was felt that the work of this Sub Committee could conveniently be dealt with by the Cotton Ginning and Pressing Factories Sub Committee, the full Committee resolved at its meeting held in January 1936 to discontinue it.

(h) *The Forecast Improvement Sub Committee* usually meets half yearly, its principal business being the improvement of the cotton forecasts of India.

(i) *The Special Sub Committee on Wider Markets* was appointed in 1933 with the object of examining the question of finding wider markets for Indian cotton. It met twice during the year under report.

(j) *The Standards Sub Committee* was constituted in April 1933 and is concerned with the preparation for use in India of universal standards of certain growths of cotton dealt with in common both by the East India Cotton Association and the Karachi Cotton Association and of certain other varieties with which only the former Association is concerned. Six meetings of this Sub Committee were held during the year.

In addition to the abovementioned Standing Sub Committees, special Sub Committees are appointed from time to time to deal with specific matters which do not fall within the purview of any of the other Sub Committees.

4. Whilst the Committee is representative of practically all sections of the cotton trade in India, it also enjoys the privilege of deputing representatives to serve on other bodies. Thus Sardar Rao Bahadur Bhimbhai Ranchodji Naik represents it on the Imperial Council of Agricultural Research and he along with Mr N M Deshmukh and Sardar Sampuran Singh represented the Committee on the Board of Directors of the East India Cotton Association up to 31st March 1936, when the last two were replaced by Mr M P Kolhe, and Mian Nurullah. On the Joint Sub Committee of the Imperial Council of Agricultural Research and of the Indian Central Cotton Committee in connection with the investigation into the cost of growing cotton, sugarcane and their rotation crops the Committee is represented by Sir Purshotamdas Thakurdas, Sardar Rao Bahadur Bhimbhai Ranchodji Naik, Mr J Vonesch, Mr Chunilal B Mehta, Mr Chumanlal B Parikh (representing the East India Cotton Association), and the Secretary. The representatives of the Committee on the Board of Governors of the Institute of Plant Industry, Indore, are the President, the Vice President (Sir Purshotamdas Thakurdas), Mr Chumanlal B Mehta, Mr Ranchodji Naik, Mr J Vonesch, Mr Chunilal B Mehta, Mr Chumanlal B Parikh, and the Secretary. The representatives of the Master Cotton Spinners' and Manufacturers Associations

MEETINGS.

5 The Indian Central Cotton Committee held two meetings during the year under review, both at Bombay. The first meeting took place on the 13th and 14th January 1936, and the following were among those who attended it by invitation —

Sir Richard H Jackson, Chairman, Lancashire Indian Cotton Committee, the Hon'ble Dewan Bahadur S T Kambl, J P, Minister for Agriculture, Government of Bombay, the Hon'ble Khan Bahadur D B Cooper, J P, Member for Revenue and Finance Government of Bombay, Mr C G Treke, ICS, Secretary to the Government of Bombay, Finance Department, Mr N C Mehta, ICS, Secretary, Imperial Council of Agricultural Research, Mr N Brodie Director, Industrial Intelligence and Research Bureau, Indian Stores Department, Mr W D M Clarke, His Majesty's Trade Commissioner at Bombay and Mr H C Short, Cotton Commissioner, Lancashire Indian Cotton Committee

The second meeting, which was held on the 17th and 18th August 1936, was honoured by the presence of His Excellency the Hon'ble Sir Robert Duncan Bell, KCSI CIE Acting Governor of Bombay. Amongst the other visitors present were Mr C H Bristow, ICS Private Secretary to His Excellency the Governor of Bombay, Mr P K Norris Agricultural Commissioner, USA Department of Agriculture and Mr N Brodie, Director, Industrial Intelligence and Research Bureau, Indian Stores Department

A list of the more important resolutions passed at these two meetings will be found in *Appendix III*

STAFF

6 Mr P H Rama Reddi continued to hold charge of the office of Secretary throughout the year

The temporary gazetted post of Personal Assistant to the Secretary, held by Mr C J Bocarro, was abolished during the year and a permanent gazetted post of Assistant Secretary was created to which Mr Bocarro was appointed

Dr Nazir Ahmad held the post of Director of the Technological Laboratory during the year and Mr R D Mihra that of Publicity Officer

I am happy to be able to record once again my sincere appreciation of the loyal co operation which I continued to receive during the year from every member of the office staff

PROVINCIAL COTTON COMMITTEES

7 The value of Provincial Cotton Committees in dealing with problems of provincial importance has been stressed in previous reports and once more the Committee records its view that where such Committees are actively functioning the work done by them has materially assisted the Committee in arriving at decisions on subjects referred to it. Local problems can be visualised in their true perspective best by Provincial Committees and therefore the discussions and the decisions of such Committees help to bridge over difficulties which the absence of the knowledge of local conditions unavoidably creates. During the year under review, the Sind and the Punjab Cotton Committees each met once and much useful work was transacted by them. The Madras Cotton Committee dealt with the scheme for the improvement of *Mungara* cotton by correspondence without actually meeting. It is hoped that the coming years will witness a revival of the activities of Provincial Cotton Committees.

CHAPTER II.

WORK OF THE YEAR

COTTON POLICY.

8 The last Annual Report referred to the conclusions arrived at by the Committee on the investigation of long and medium staple in the Whist these investigations were threatened Japanese boycott of Indian cotton in 1933 and the consequent growing apprehension of the serious risk India ran by depending too much on the limited market for her short stapled cotton, they have yielded information which will be of considerable value in framing the future cotton policy of the country in view of the world's present tendency towards the spinning of finer counts for which short staple cotton is unsuitable. The survey further brought to light the fact that apart from these areas which were suitable for the production of long or medium staple strains and where already the cultivation of such types was on hand, the adoption of dry farming methods of cultivation in certain tracts would overcome the difficulties imposed on the growing of long and medium staple cotton by reason of the precarious rainfall of the tracts in question. Investigation on these lines is accordingly being undertaken in the Westerns tract of Bijapur district in the Bombay Presidency and in the Raichur and Gulbarga districts of the Hyderabad State with the aid of grants to the Imperial Council of Agricultural Research, who have already in operation dry farming schemes in those tracts. A further step forward has been taken in connection with the improvement of *Dholleras* cotton, as during the year the Committee sanctioned a scheme having for its object the tackling of the cotton problems of the *Dholleras* tract—an extensive area to which little attention had been paid in the past. The collection of *Iran* cottons for the purpose of evolving early *herbaceum* strains suitable to some parts of the *Dholleras* tract was also set in motion during the year. The eradication of the Pink Boll worm in the United Provinces which is expected to lead to the improvement of the quality of cotton in the United Provinces has definitely proceeded forward with the introduction of the Cotton Pest Control Bill in the United Provinces Council.

The activities of the Committee are steadily forging their way into the agricultural economy of the country and those acquainted with its history will not have failed to notice how the work of the Committee has extended and expanded in the course of years and how certain schemes of the Committee have, as through a process of natural evolution, found their counterpart in schemes of another type. For instance, the old breeding and survey and mycological schemes have developed into seed distribution and extension schemes and from entomological schemes have sprung up schemes for clean up propaganda and schemes for popularising the use of plant pullers for up rooting cotton stubbles.

It has been urged in some quarters that the Committee should extend its activities by including in its programme investigations on soil fertility and on improvements in the method of compost manufacture. The importance of these problems is fully realised by the Committee, but it has always held the view that work on these lines is the function of Provincial Agricultural Departments and that it is not a special problem of cotton cultivation. The study and demonstration of methods for the maintenance of soil fertility is a fundamental part of the work of Agricultural Department and they are already devoting considerable attention to it. The Committee has deliberately concentrated on problems connected with cotton in preference to that affecting all crops in all parts of the country. The Committee aims at supplementing and not supplanting the work of the Agricultural Department and so far there has been no occasion for it to deviate from this accepted principle.

COMPACT BLOCK OF LONG STAPLE COTTON IN SIND

9. It was stated in last year's report that the Government of Bombay the Committee's recommendation to set aside a compact block of long staple cotton for their concurrence with the conclusion arrived at by the Chief Agricultural Officer in Sind that the area south of the Jodhpur Railway was the most suitable for such purpose. During the year under review, the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936, which provides for the licensing of gins and presses, was passed into law and was made applicable in the first instance to the province of Sind, with effect from such date as the Local Government may, by notification, appoint. Owing to certain difficulties which subsequently arose, the issue of the notification has, however, been delayed. The Act has for its object the prevention of malpractices arising from the watering, mixing or admixture of cotton and the desirability of the early application of the Act to Sind, where the malpractices referred to are non-existent or only in their incipient stage, led the Committee at its meeting in August 1936, to pass a resolution urging on the Government of Sind the necessity of taking very early steps to make the Cotton Ginning and Pressing Factories (Bombay Amendment) Act effective in that province by framing rules as early as possible before malpractices became established in the newly developed cotton tracts. With regard to the reservation of compact block for the growing of superior varieties of cotton, the Bombay Government have declared that in accordance with the policy of the Agricultural Department in Sind the seed of the improved varieties 289F and 289F (1) only will be distributed in this area. In the opinion of the Local Government the application of the Cotton Transport Act to the proposed block in order to prevent the importation of *kapas* from outside the area for purposes of mixing presents practical difficulties. They consider that the absence of natural boundaries around the cotton growing areas and the lack of regular routes of communications in Sind would make the enforcement of the Act both costly and difficult. Should, however, experience

indicate at a later stage of development of the area that it is desirable to prohibit the import from the Punjab by rail of inferior seeds into Sind for sowing purposes, necessary action will be taken. It is felt, however, that such action would be possible only when an adequate supply of the seed of the varieties 289F and 289F(1) are available for the tract—a condition which, it is estimated, would take two years to fulfil.

SPREAD OF GARROW HILL COTTON IN THE CENTRAL PROVINCES

10 The recommendation of the Central Provinces Provincial Cotton Committee, which was endorsed by the Committee last year for the adoption of legislative measures for the eradication, from the Central Provinces and Berar, of *Garrow Hill* cotton, a very inferior short staple but prolific variety, which has lowered the reputation of even the superior types of cotton in the tract, was accepted by the Central Provinces Government. A Bill* for the prohibition of the cultivation of *Garrow Hill* cotton in the Central Provinces was introduced in the Central Provinces Legislative Council and has been referred to a Select Committee.

BOMBAY COTTON CONTROL ACT

11 As foreshadowed in last year's report, the Bombay Government introduced in the Legislative Council in September 1935, the Bombay Cotton Control Bill, having for its object the prohibition of the cultivation, mixing or possession of *Goghari*, an inferior type of cotton which was spreading to an alarming extent in the Surat tract and threatening the reputation of 1027 *ALF* to the detriment of the cotton growers of Surat. With commendable expedition the Bill passed into law in November 1935. The Committee is confident that this piece of legislation will go a long way towards improving the quality of cotton of the Surat tract and that the benefits to the grower expected from the Act will soon be realised. A copy of the Act will be found in *Appendix V*.

As *Goghari* was spreading also in the Baroda State whose territory is interlaced with the Bombay Gujerat, the Durbar, by notification, applied the provisions of the Bombay Cotton Control Act, with slight modifications, to the State.

LANCASHIRE INDIAN COTTON COMMITTEE

12 The work of the Lancashire Indian Cotton Committee as recorded in its 2nd Annual Report evoked the commendation of the Indian Central Cotton Committee at its meeting in August 1936, when the report was considered. Whilst expressing its satisfaction that through the sustained efforts of the Lancashire Committee the takings of Indian cotton by Lancashire the Committee could not avoid the feeling existed for the more extended use of Indian. On the basis of a production of yarns upon which roughly computed that Lancashire's

* This Bill has since become law.

requirements of raw cotton amount to 1,363,000 bales and for much of this Indian cotton is suitable. Even allowing for the fact that Lancashire mills employ a certain quantity of waste and long staple cotton, the achievement of yarns up to

achievement

the position is

The Committee is not unmindful of the existence of factors which militate against the adoption in manufacture of a class of cotton not previously employed and of possible prejudices to be overcome anterior to such employment, but it is confident that with the judicious use of the weapon of propaganda, which has already proved to be effective, reinforced with the experience of the past, the aspect of the problem will be changed in the not distant future. The large increase in the takings of Indian cotton in the last three years is a striking testimony to the efficiency of the organisation and propaganda of the Lancashire Indian Cotton Committee. It has been suggested to the Lancashire Indian Cotton Committee that one direction in which the use of Indian cotton in the United Kingdom could be furthered was by approaching the subsidiary industries like the woollen, belting, gun cotton and explosives, motor car, etc., which consume a certain quantity of cotton in the manufacture of various articles, and by impressing upon them the desirability of using Indian cotton in preference to foreign grown. The Lancashire Indian Cotton Committee is fully assured of the goodwill and co-operation of the Indian Central Cotton Committee in the mutual aim of the two bodies for the more extended use of Indian cotton in the United Kingdom.

The following figures of consumption of Indian cotton by, and the imports of Indian cotton into, the United Kingdom are very illuminating in regard to the achievements of the Lancashire Indian Cotton Committee and the progress made by Indian cotton in Great Britain —

Year (August 1 to July 31)	Lancashire Indian Cotton Committee	Liverpool Cotton Association	Depart of Com Intelligence & Statistics Calcutta	* Total exports to all countries
	<i>Millions of lbs (Consumption)</i>	<i>Thousands of bales (Running Imports into U K)</i>	Exports to U K (Thousands of bales of 400 lbs)	
1928-29	72	228	233	3,933
1929-30	73	291	286	3,868
1930-31	98	281	274	3,729
1931-32	72	137	128	1,592
1932-33	49	230	257	2,868
1933-34	92	362	367	3,270
1934-35	133	394	374	3,115
1935-36	Figures not available	547	533	3,826

* From 1931-32 exports from Kathiwar Ports are included.

THE COTTON TRANSPORT ACT

13 At the request of the Indian Central Cotton Committee the Government of India passed in 1923 the Cotton Transport Act, which enables local Governments to prohibit the import for purposes of mixing and substitution of inferior cotton into areas growing superior varieties within their jurisdiction

Madras—There was no change in the protected areas in the Madras Presidency

Bombay—Only one of the seven protected areas notified in the Bombay Presidency changed during the year under report. It was stated in the last year's report that the Committee approved of a proposal of the Director of Agriculture, Bombay Presidency, to fix the Mahi river as the northern boundary of the Nerbudda Mahi protected area. The Local Government have since accepted this proposal and have notified the change accordingly.

Central Provinces—During the year the Narsinghpur Sub Division was included in the protected area with the object of preventing the import of Bengals cotton into the province for the purpose of mixing.

Indian States—There was no change in the protected areas in Hyderabad, Indore, Sangli, Rajpipla and Chotta Udepur which are the only Indian States that have such legislation in force.

THE COTTON GINNING AND PRESSING FACTORIES ACT

14 During the year under report nearly a score of cases of infringement of the Act were brought to the notice of the authorities concerned. In some cases either the wrong year or indecipherable or incorrect marks were put on bales, while in one or two cases press marks were absent. In almost all cases the factory owners were warned, in only one case in the United Provinces a fine of Rs. 25 was imposed on a factory owner. In cases where breaches were due to misunderstanding of the procedure, instructions as to the proper method of marking bales were issued to factory owners and they were directed to be more careful in future. In one case of bales with incorrect marks a District Magistrate held in favour of the East India Cotton Association. Law unless it was proved by the evidence clerk and considered that the production of evidence in much greater expense than fines. The East India Cotton Association, to whom the matter was referred, held that if this attitude were adopted the Act would remain a dead letter and they suggested that the difficulty and expense of producing evidence could be got over by issuing a commission to Bombay to take the evidence of the seller, one of the arbitrators and the survey clerk.

Mention was made in last year's report of the warning given by a Collector to a factory owner for the use of unauthorised weights in the factory and of the fact that the attention of the Local Government was drawn to the leniency of the punishment. The Local Government concerned issued a circular to all District Magistrates instructing them to institute prompt proceedings against factory owners caught using unauthorised scales or weights as such practices involved loss to the illiterate cultivator.

Most cotton producing Indian States have fallen into line with British India in legislating for the purpose of the marking of bales and the submission of weekly returns of cotton pressed. During the year, the Mahya and Khairpur States introduced similar legislation thus bringing the total to 67. Out of these weekly press returns were received from sixty, Gwahor being amongst those from whom such returns were not received.

LICENSING OF GINNING AND PRESSING FACTORIES

15 It is gratifying to record that one of the first pieces of legislation advocated by the Committee almost since its inception has at last found a place in the statute book of the Bombay and Central Provinces Governments. This step was taken as the result of the decision of the Government of India not to undertake legislation themselves for the licensing of ginning and pressing factories but to leave it to local Governments to do so if they desired. Acts amending the Cotton Ginning and Pressing Factories Act were passed by the two Local Governments mentioned making it obligatory on all cotton ginning and pressing factories situated in areas to which the Act may be applied to take out licenses, and prohibiting watering, mixing or admixtures of cotton. It is the belief of the Committee that these measures will go a long way in suppressing the malpractices which are detrimental to the interests of the cotton grower as they mar the fair name of Indian cotton both in India and abroad. Although the Bombay Act has, in the first instance, been made applicable to Sind—now a separate province—it will not, as originally hoped, be in operation during the revenue year 1936-37, as the Sind Government have not been able to pass the necessary rules under the Act before the commencement of the cotton season. The Bombay Government have under contemplation the application of the Act to other parts of the Presidency. Owing to the enactment of similar legislation by the Central Provinces Government, the Indian Central Cotton Committee, at its meeting in August 1935, passed a resolution urging on the Bombay Government to apply the Act to the Khandesh tract of the Bombay Presidency. The Central Provinces Act extends to the whole of the province and will be in operation as soon as the required rules which are under the consideration of the Local Government have been framed. Copies of the Bombay and Central Provinces Amendment Acts will be found in *Appendices I I and VII*. The Punjab Government have also under consideration the introduction of a similar measure, the chief problem there being the mixing of cotton. Among Indian States, Hyderabad has been a pioneer in the field of legislation of this type, the licensing of cotton ginning and pressing factories being in operation there from 1931.

MALPRACTICES

16. The East India Cotton Association reported five cases of bales having been rejected or "marked off" allowance on account of the cotton being heavily watered. These bales were from Navsari and Shendurni (East Khandesh), in the Bombay Presidency, Virudnagar in the Madras Presidency, and Mandi Irbahali in the Punjab. Certified copies of entries in the press registers pertaining to the bales in question were called for under Section 3(3) of the Cotton Ginning and Pressing Factories Act and the information received was passed on to the East India Cotton Association.

An exporting firm in Bombay reported that two lots of 48 and 41 bales each of cotton purchased by them were found to be heavily watered. As the press marks showed that the bales came from Arvi, a certified copy of the entry in the press register relating to the bales in question was called for and the information was supplied to the firm concerned.

Complaints were received from Japan to the effect that full pressed bales were being opened in Bombay and after being fraudulently mixed with inferior cotton were repressed and exported to Japan. The East India Cotton Association, which had also received similar complaints, had replied

merely drawn to the reply of the Association

Complaints were also received from the International Federation of Master Cotton Spinners' and Manufacturers' Associations, Manchester, about the presence of foreign matter in Indian cotton. The Committee felt, however, that a general condemnation of the ginning of Indian cotton was not helpful towards a solution of the question and also that the complaints themselves were greatly exaggerated. The Federation were in the importance of exporting cotton for any complaint though actually very small in comparison with the opinion, Indian cotton was far more better than any other growths and as a result of better supervision the present position of foreign spinners reported the press marks and serial numbers of bales containing badly ginned cotton. Information was subsequently received that the reply of the Committee was fully discussed by the International Cotton Committee at its meeting in April 1933, and it was admitted that the Indian Central Cotton Committee was doing its best to eliminate the cause of spinner's complaints in East Indian cotton.

A complaint from one of the members of the Committee regarding the "injab American" cotton was reported who issued a circular to all owners them to take steps to avoid the recurrence of such complaints and to take necessary precautions to raise the standard of the ginning and pressing of cotton.

A reference from the Hyderabad State, regarding the presence of excessive seed in pressed bales of cotton, was forwarded for an expression of opinion to the East India Cotton Association who suggested in reply the installation in ginning factories of special sieves about four feet square, made either of baling hoops or expanded metal, whereby the cotton would be caught up and the seed which accidentally got mixed with the cotton would drop through the sieves. This suggestion was passed on to H E H the Nizam's Government.

As a result of reports received during the year that mill fly, droppings, cotton waste, and even old crop cotton were being mixed with good cotton in Khandesh, the matter was brought to the notice of the Bombay Government with the object of their taking steps under the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, for the effective prevention of this malpractice. In their reply the Bombay Government expressed their intention of awaiting the results of the propaganda work which the Agricultural Department was carrying on against the practice in question before taking action in the matter.

In connection with the mixing of cotton waste with good cotton, it was noticed that cotton waste was being brought to the Dhulha cotton market in increasing quantities and as most of it was used for mixing with good cotton, a reference on the subject was made to the Chairman of the Dhulha Cotton Market Committee. He reported that the entry of cotton waste into the market could not legally be prevented, since dealings in cotton waste were recognised under the Bombay Cotton Markets Rules, he, however, considered that the only remedy for preventing the mixing of fly, mill dropping and cotton waste with good cotton was the application of the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, to the whole of the Khandesh tract and the amendment of the definition of "cotton" so as to exclude from it "cotton waste" and "mill droppings," which should be brought under the category of foreign substance.

The Committee at its meeting in August 1936 passed a resolution requesting the Government of Bombay to extend the Cotton Ginning and Pressing Factories (Bombay Amendment) Act to East and West Khandesh, and other tracts of the Bombay Presidency, particularly in view of the fact that the Central Provinces Government had already passed similar legislation. The resolution also drew the attention of the Government of Bombay to the fact that the Bombay Act as at present worded did not

prevent the mixing of cotton waste with cotton and requested them to take in hand the necessary amendment for this purpose

The presence of seed and impurities in full pressed bales from various places in the Punjab and the Patiala State continued to be the subject of complaints. The Director of Agriculture, Punjab, was requested to bring the complaints to the notice of factory owners concerned in the Province and to impress on them that such malpractices lowered the reputation of the cotton of the tract and adversely affected the interests of the trade and the cultivators. Action as suggested was accordingly taken. As regards the complaints from the Patiala State, the attention of the State authorities was drawn to the careless manner in which ginning was done and to the existence of admixtures of seed in Patiala cotton. Intimation was subsequently received to the effect that steps were being taken to put a stop to the malpractice complained of and that a warning had been issued to the factory owners.

At the suggestion of a cotton exporting firm in Karachi, the Karachi Cotton Association was addressed regarding the desirability of circularising during the coming season those cotton containing impurities not found indulging in malpractices. The Karachi Cotton Association and also the East India Cotton Association agreed to address the factories concerned first in a friendly way and to await the result of the propaganda carried on before taking action on the lines suggested.

In the absence of legislation for the suppression of malpractices, a suggestion was made to the East India Cotton Association, that they should tackle the problem by imposing penalties and issuing, if necessary, instructions to its surveyors and arbitrators to be more strict in their awards. In their reply the Association stated that the question of taking effective measures against watering would be considered by the Board after the results of tests on the moisture content of cotton become available. As regards false packing, the Association had under consideration the question whether cotton containing excessive seed and/or crushed seed should be rejected by the award of sufficient 'off' allowances irrespective of other characteristics of the cotton.

COTTON MARKETS

17 In the Bombay Presidency, a cotton market was established at Dhulia in 1930, another at Amalner in 1934 and a third at Balthongal in 1935. During the year under report no appreciable progress was made in the establishment of regulated cotton markets though Bombay Government expressed themselves as being in favour of establishing regulated cotton markets at Broach and Bijapur and at Bavla in the Ahmedabad District.

In the Central Provinces two regulated cotton markets have been in existence under their Act which was passed in 1932—one at Warora and another at Chanda. The reasons given for the non establishment of a larger number of regulated markets were (1) the apathy or active opposition of local bodies, in whose hands lay the initiative of applying for their establishment, for fear of losing power, (2) the reduction of the income from cotton markets owing to the failure of the cotton crop for four consecutive years and (3) the small volume of cotton marketed in some places which did not justify the formation of a separate market for cotton. The Central Provinces Legislative Council passed during the year under report a law empowering the Local Government to establish regulated cotton markets even without the consent of the local bodies concerned. It is hoped that this measure will lead to the more rapid establishment of regulated cotton markets. The Municipalities of Wardha and Hinganghat have already applied for the issue of the necessary notification making the Act applicable to the markets at those stations. The Local Government have under contemplation the application of the Central Provinces Act to Berar also and the repeal of the separate Act in force there.

In the Madras Presidency, there is only one regulated market—at Tiruppur in the Coimbatore District—established under the provisions of the Madras Commercial Crops Markets Act, 1933. During the year two amending Acts to the Madras Commercial Crops Markets Act were passed, the first of which empowers the Government to nominate all the members of Market Committees when a Market Committee is to be established for the first time this ensures that no time is lost in connection with the elections before a Market Committee is brought into existence. The original Act required that out of the twelve members constituting the Market Committee, two should be nominated by Government and the rest elected. This amendment further confers on the Local Government the power to alter the limits of the notified area. The second amendment makes it obligatory on all ginning and pressing factory owners to take out licenses to enable them to carry on their business for the sale and purchase of cotton. This Act further provides for dealing with the continued absence of members of Market Committees.

The Punjab Government are for the present not in favour of the establishment of regulated cotton markets.

In Sangli State the original Huzur Order regulating the sale and purchase of commercial crops in the State continued to be in force.

In the Baroda State, the framing of rules under the Baroda Agricultural Produce Markets Act, referred to in previous reports, is still under contemplation.

In Hyderabad State there are several cotton markets to which the Hyderabad Agricultural Markets Act has been applied.

UNIVERSAL STANDARDS FOR INDIAN COTTONS IN INDIA

18 In accordance with the Committee's decision the Standards Sub Committee passed during the year under report the universal standards in India for the following varieties of cotton —

<i>Bengals</i>	<i>Sind American</i>	<i>Mathias.</i>
<i>Sind</i>	<i>Kumplas</i>	<i>Broach</i>
<i>Punjab American</i>	<i>Oomras</i>	<i>Dholleras</i>

The reference standards of the Committee were stored at Bangalore in hermetically sealed zinc cases and on being compared at the time of the preparation of the current season's at Sewri in the ordinary way, they better in colour. The Standards S in future the Sewri sets also should cases with a view to finding out to attributable to difference in climate.

It might perhaps not be without interest to record here the reasons which led the Committee to move in the direction of establishing universal standards for Indian cotton and the extent to which its objective has been accomplished. Prior to 1933 there were two separate bodies in India which prepared standards for Indian cotton, viz., the East India Cotton Association and the Karachi Cotton Association. The latter Association prepared standards for *Bengals*, *Sind*, *Punjab American* and *Sind American* cottons only whilst the former had, in addition to standards for the first three varieties of the cottons mentioned, standards for other varieties of Indian cotton also. It was observed that the standards of the cottons dealt with by the two Associations differed from each other and as this resulted in certain amount of competition between the two markets which was likely to be detrimental to the interests of the cotton trade as a whole, it was considered desirable to adopt standards which would be of universal application throughout the country. It was also felt that the Indian Central Cotton Committee was the body best fitted to take the initiative in this matter and as a result of the Committee's intervention standards common both to the Bombay and Karachi cotton markets were prepared for the first time in 1934. Whilst it is too early to expect any appreciable trading in these Universal standards, it is noteworthy that the Karachi Cotton Association have decided to accept the Universal Standards of the Committee as the basis for the Karachi standards, and that the Standards Committee of the East India Cotton Association have recommended to the Board of Directors of the Association that the Universal Standards should be adopted as the basis for the preparation of the official standards of the Association. Thus in respect of the varieties of cotton dealt with by both the Associations, the standards for them will be common in all but name.

REPRESENTATION ON THE INTERNATIONAL FEDERATION OF MASTER COTTON SPINNERS' AND MANUFACTURERS' ASSOCIATIONS

19 Mention was made in last year's report that in order to deal more effectively with complaints arising abroad regarding faults, often of a minor nature, in Indian cotton which frequently received wide publicity through the publication of the proceedings of the bodies at which they were discussed, the Committee considered it desirable to obtain, if possible, representation on the International Federation of Master Cotton Spinners' and Manufacturers' Associations, Manchester. The Committee has since been admitted as an Associate Member of the Associations and this will ensure the proper presentation of the position in India, both by the Committee or its duly appointed representatives, whenever cases relating to Indian cotton come up for discussion at meetings of the Federation.

THE UNITED PROVINCES COTTON PEST CONTROL BILL

20 The cotton crop of the United Provinces is subject to attack by the Pink Bollworm and it is calculated that upwards of 25 per cent of the crop of this province in normal years and nearly 50 per cent in some years is destroyed by this insect pest. The normal loss to the cultivator is estimated at Rs 10 to Rs 15 per acre. As a result of continued research between 1923 and 1931 financed by the Committee, it has been ascertained that the treatment of all cotton seed by heating to an appropriate temperature kills the hibernating larvae and diminishes the attacks of this pest with consequent increase in yield and income. To reduce its depredations the United Provinces Government have accordingly introduced in the local legislature the United Provinces Cotton Pest Control Bill,* which provides for all cotton seed in the notified area to be subjected to heat treatment before being sown. With the passing of this piece of legislation, the cultivators within the sphere of its operation will reap the higher profits which the cotton has shown to be capable of as the result of the best treatment.

future progress viz, the growing of long staple cotton in the United Provinces

MEANS TO PREVENT THE INTRODUCTION OF FOREIGN COTTON PESTS

21 *The Mexican Boll weevil (Anthonomus grandis)*—The restrictions placed by the Government of India in 1925 on the import of American cotton into India with a view to prevent the introduction of the Mexican Boll weevil continued in force, without change, during the year under review. Under these regulations American cotton can be imported into

* The Bill has since been passed into Law (Appendix VIII)

India only through the port of Bombay and after fumigation with hydro cyanic acid gas on payment of the prescribed fees Imports of American cotton declined to 21,121 bales during the year from 63,171 bales in the preceding year During the year the Government of India at the request of the Committee made permanent the reduced fees of Rs 2 7 per square bale and of Re 1 8 per round bale of American cotton

The Red (Sudan) Boll worm (Diparopsis castanea) and other pests—The entire prohibition of the import of foreign *kapas* (unginned cotton) under Government of India Notification No 897 Agri, dated the 24th July 1925, and the restrictions placed on the import of foreign cotton seed under Notification No 1213 Agri, dated the 27th May 1930, of the Government of India in the Department of Education, Health and Lands remained in force throughout the year Under the 1930 Notification 10 parcels of cotton seed were received, examined, and where necessary, fumigated, during the year

COLLECTION AND SUPPLY OF INFORMATION

22 As usual, notes* on the progress in the Provinces and Indian States in the introduction of improved varieties of cotton and on the work of the Committee were supplied to the East India Cotton Association and the Karachi Cotton Association for publication The weekly statements of purchases and arrivals of American cotton were published as usual for general information The names of ginning and pressing factories in Indian States with the requisite details regarding press marks, name of owner or occupier, etc, were obtained and communicated to the Director General of Commercial Intelligence and Statistics Calcutta for publication in the *Indian Trade Journal* and for incorporation in the list of Cotton Ginning and Pressing Factories published by that Department

PUBLICITY AND PROPAGANDA

23 The Annual Report of the Publicity Officer, which forms Chapter VII of this Report, gives a full account of the activities of the Publicity and Propaganda Department of the Committee

The most important event of the year was the drive initiated by the Bombay Department of Agriculture, with the Committee's co-operation to eliminate the inferior type of cotton known as *Goghari* from the Surat tract The anti *Goghari* poster 'Get rid of the weight, placards, etc, were used with much advantage during the campaign Only partial success, however, attended these efforts as owing to its higher ginning percentage, *Goghari* was mixed with Surat 1027A LF and the mixture was passed off as genuine *Navsari* In order to put a stop to this malpractice, legislation

* Appendix IX

was introduced in the Bombay Council and passed* prohibiting in any notified area the cultivation of *Goghari* cotton, its mixture with any other cotton and the possession, use or trade in such cotton either alone or mixed with other cotton

Fifteen press *communiqués* were issued, two of which dealt with the development of cotton growing in Sind and the Bombay Presidency and one with the improvement of cotton in India

Besides the special articles and pamphlets issued from time to time the Department also participated in the Rural Life Exhibition at Baroda, organised in celebration of the Diamond Jubilee of H H the Maharaja of Baroda, the All India Industrial Exhibition, Delhi, the Fair in Rajputana, the Crop Demonstration at Amraoti and Yeotmal and the Fair and Demonstration at Warora in the Central Provinces

PUBLICATIONS

24 The Committee receives partly by subscription and partly on an exchange basis a number of important scientific and technical journals which are circulated to research workers under the Committee. This arrangement not only effects economy but also affords to the Committee's research workers an opportunity of perusing varied and up to date scientific literature which otherwise would not ordinarily be available to them

The Committee desires to express its indebtedness to those institutions on whose free mailing list its name has been placed. Particular mention may be made of the British Cotton Industry Research Association for its *Summary of Current Literature* and the Shirley Institute *Memoirs*, the

mittee has also to record its thanks to the Indian Trade Commissioner, London, the U S A Department of Agriculture, the Egyptian Ministry of Agriculture, Technical and Scientific Service, the Liverpool Cotton Association, the Lancashire Indian Cotton Committee, the Imperial Bureau of Plant Genetics, Cambridge, the Textile Institute, Manchester, the Imperial Institute, London, the Indian Statistical Institute, Calcutta, the National Institute of Sciences, Calcutta, the Academy of Sciences and other Associations and Chambers of Commerce for supplying it with reports, statistics and other literature from time to time. The Committee is also on the free exchange list of the Imperial Council of Agricultural Research, the Imperial Institute of Agricultural Research, Delhi, and the Director General of Commercial Intelligence and Statistics, Calcutta

SECRETARY'S TOURS

25 The places visited by Secretary between the 1st September 1935 and the 31st August 1936, in connection with the work of the Committee were —

Mirpurkhas, Oderolal, Sakrand, Sukkur, Lloyd Barrage, Alman John and Dadu in Sind, Parbham, Nandapur, Nanded, Latur, Chikurda, Ardhapur, Hadgaon, Basar and Madhol in the Hyderabad State, Coimbatore, Perundurai, Tiruppur and Ootacamund in the Madras Presidency and Indore and Delhi

FINANCIAL

26 In *Appendix X* will be found a statement showing the Receipts and Expenditure of the Committee and also the Balance Sheet for the year ending 31st March 1936. Receipts amounted to Rs 10,12,740, and expenditure to Rs 11,40,629

With the separation of Burma from India under the new constitution, the cess hitherto collected from that Province will no more be available to the Committee, this loss, however, will to some extent be compensated for the fact that the Committee will not be called upon to sponsor cotton schemes in that Province after separation

was extended by three years up to 15th June 1939, at an additional cost of Rs 16,500. During the year under report a recurring error which was rectified was found to be the adoption in the forecast estimates of several Indian States in the Bombay Presidency of a standard for a normal crop in vogue in British India. Further, for some Indian States, those for which no standard was provided and thus procedure was found to be defective in the cotton forecasts of some of the States.

With a view therefore to formulate independent standard yield figures to replace those now used efforts were made to obtain actual yield figures and to average them over a series of years. As regards the determination of the available statistics for the purpose of separate standard yield figures for cotton in irrigated and non irrigated areas, and it is accordingly proposed to prepare the forecasts of 1936-37, on this basis.

One of the factors adversely affecting the accuracy of Government cotton forecasts in India is the lack of exact information regarding the quantity of *kapas* (seed cotton) and loose (ginned but unpressed) cotton which is consumed chiefly in villages for such domestic purposes as hand spinning, making of quilts, mattresses, cordage, etc. Such extra factory consumption is roughly estimated at 750,000 bales for the whole of India. To arrive at a more reliable estimate of the extra factory consumption, local enquiries were conducted in typical localities in different provinces and States with the aid of funds provided by the Indian Central Cotton Committee. Until all the reports are received and considered it is too early to say whether any alteration in the conventional estimate of 750,000 bales for extra factory consumption can be recommended or whether further investigations will be necessary before a final decision is arrived at.

As a result of the *post mortem* examination of the cotton forecasts of each season, the subject of the improvement of the cotton forecast is engaging the close attention of the authorities concerned to whom a forum for the exchange of views and discussion of common problems is afforded by the half yearly meetings of the Cotton Forecast Improvement Sub Committee. As a result of the critical examination of the sources of error in the cotton forecasts of past seasons tentative revised standard yield figures have been adopted for Sind and for parts of the Bombay Presidency. Crop cutting experiments now under way in the British districts of the Punjab on a more extensive scale than before will, it is hoped, provide a more reliable basis for fixing the standard yield figures, while the institution in the Central Provinces and Berar of weekly ginning returns with effect from the season of 1935-36 has brought the problem of improving the accuracy of the cotton forecasts of that province nearer solution. In view of the under estimation noticed in the cotton forecasts of the Mysore State in the past seasons proposals for conducting crop cutting experiments during 1936-37 to arrive at more accurate standard yield figures are under consideration by the State.

30 *Staple Length of the Indian Cotton Crop*—As usual a report on the estimated production during the season of Indian cotton of different staple lengths was issued in May. At the suggestion of the trade, which was accepted by the Committee, trade estimates were for the first time in this respect shown side by side with Government estimates. Whilst it is realised that the reconciliation of the Government with the trade estimates is not unattended with difficulty as the basis under which the two estimates are prepared are dissimilar, its bearing on the problem of the accuracy of the Government cotton forecasts warrants its examination. The Committee warmly acknowledges the assistance which it has received from the trade in this connection.

31 *Press Statistics*—Since 1925, weekly returns of cotton pressed in British India have been collated by Provincial authorities under the Indian Cotton Ginning and Pressing Factories Act, 1925 and forwarded to the Director General of Commercial Intelligence and Statistics for publication. To make the statistics of cotton pressed complete for the whole of India, the co-operation of Indian States for the States was enlisted and it seven States addressed have respectively passing the necessary executive or previous year's report that press returns for the Gwalior State would be available from 1935-36 has unfortunately not materialised owing to certain administrative difficulties, which, however, have since been overcome and it is hoped that the returns will be available from the 1936-37 season.

During the season 1935-36 4,321,364 bales were pressed in British India and 1,623,169 bales in Indian States making a total of 5,944,533 bales for the whole of India, the corresponding figures for the preceding season being 3,444,875, 1,166,938 and 4,611,813 bales, respectively.

32 *Loose (Unpressed) Cotton Statistics*—The statistics of cotton pressed referred to in the preceding paragraph do not account for the whole of the Indian cotton crop, as, besides the cotton utilised for village or extra factory consumption chiefly in the form of *kapas* for which as explained elsewhere efforts are being made to obtain a more reliable estimate mills situated in the heart of cotton growing areas use considerable quantities of loose (ginned but unpressed) cotton. To account for this, the statistics of loose cotton received at mills in the major cotton growing provinces have therefore been obtained on a voluntary basis since 1926 and published. In 1935-36, 264,000 bales of loose cotton were received at mills in the major cotton growing provinces of British India. The relevant figures for 1926-27 to 1935-36 are shown in *Appendix VI* to this report.

During the year under report, the Government of India, on the recommendation of the Committee, amended the form of monthly returns required to be submitted by mills under the Indian Cotton Cess Act, as a result of which the quantities of pressed and unpressed cotton consumed

in mills have now to be shown separately in the prescribed returns. The Indian States concerned have also extended their co-operation by instructing the mills within their jurisdiction to furnish the information supplied voluntarily by them elsewhere in a similar manner. The figures for unpressed cotton consumed in mills collected largely under statute will now ensure the publication of more accurate and complete information for the whole of India.

33 *Consumption* — As in the past, figures for the consumption of Indian cotton in mills in British India and Indian States were published monthly. The season's total consumption of Indian cotton in mills in India amounted to 2,677,572 bales of 400 lbs. net and established a new record, breaking the previous year's record figure of 2,612,132 bales (*vide Appendix XI*). Compared with last year, the consumption of cotton in the Bombay Presidency showed a decline whilst Indian States, the United Provinces, the Central Provinces and the Madras Presidency all registered increases.

According to the figures published by the International Federation of Master Cotton Spinners' and Manufacturers' Associations the world's total mill consumption of Indian cotton, exclusive of Germany and Italy (for which figures are not available), showed a slight decrease from 5,414,000 bales during the year ending 31st July 1935 to 5,393,000 bales during the corresponding period of 1935-36.

34 *Exports* — The exports of Indian cotton during the season totalled 3,826,000 bales of 400 lbs. each against 3,115,000 bales in the previous year.

35 *Stocks* — Up to 1933 reliable estimates of the stocks of Indian cotton held in mills and at trade centres in India on 31st August were not available except for the Island of Bombay. In view of the value of these figures to the trade as well as to the authorities in the Provinces and States responsible for preparing and checking the cotton forecasts, the Committee has been endeavouring since 1933 to collect the desired information on a voluntary basis through the co-operation of mills, trade associations, Cotton Market Committees and other official sources. Though the problem is not an easy one due to its wide ramifications, considerable headway has been made, and in course of time with an increasing realisation of the usefulness of these statistics, it is hoped, accurate and complete figures will become available.

The information collected in respect of the stocks held on the 31st August 1936, is contained in *Appendix XII*.

As regards the very late crops, viz., *Sileru*, *Cambodia* and *Tinnevelly* of the Madras Presidency, the season for which is taken to be the year ending 31st January, the Director of Agriculture, Madras, has made the following statement:—
 "The stocks held on 31st January, by the mills in the whole of the Presidency and 1936 are given in *Appendix XII*."

Statistics of the export cotton are of considerable importance in directing and shaping the cotton policy of India and the Committee has, therefore, for some time past, been collecting the relevant data through direct enquiries on a voluntary basis. Further, to enable the grower to realise the best value for his cotton, it is essential that he should grow those types for which the demand is keen and these statistics therefore serve as a guide to him. The tables in Statistical Leaflets Nos 3 and 4, Third Issues (1935-36), giving the results of the inquiry carried out in respect of exports and receipts at mills during 1935-36, are reproduced in *Appendices XIII and XIV*.

37 *Publications*—The undermentioned publications were issued during the year under report —

- (1) *Statistical Leaflet No 1*, Third Issue (1935-36), "Report on the Staple Length of the Indian Cotton Crop of 1935-36 season"
 - (2) *Statistical Leaflet No. 2*, Second Issue (1934-35), "Stocks of Indian raw cotton held in India by the mills and the trade on 31st August 1935"
 - (3) *Statistical Leaflet No 3*, Second Issue (1935-36), "Receipts at mills in India of raw cotton classified by varieties—1934-35 season"
 - (4) *Statistical Leaflet No 4*, Second Issue (1934-35), "Export by sea of Indian raw cotton classified by varieties—1934-35 season"
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CHAPTER IV.

RESEARCH

38 THE Indian Central Cotton Committee carries out its research policy by direct control of the Technological Laboratory at Matunga, Bombay, and by granting subsidies to Departments of Agriculture in provinces and States for the investigation of cotton problems mainly of an all India importance or for large areas where cotton is an important crop. In addition the Committee contributes a large sum of money for the maintenance of the Institute of Plant Industry, Indore, where problems of fundamental, economic and agricultural importance are under investigation. The problems of research in provinces and States include, as explained in previous years, several schemes—botanical for breeding high yielding superior types of cotton, entomological for the study of the life history of certain cotton pests and finding out measures to combat them, mycological for ascertaining ways and means to prevent loss due to wilt and root rot and

report there were in all twenty nine research schemes and seventeen seed schemes under operation, the total amount sanctioned a further sum of Rs 3,91,663 4 10. The Technological Laboratory, Matunga the Institute of Plant Industry, Indore the cost of cotton, sugarcane and their rotation crops. The Committee also offers scholarships and training grants for post graduate training in India and abroad in subjects connected with cotton industry. All schemes, scholarships and training grants are first thoroughly examined and approved by the Agricultural Research Sub Committee and the Technological Research Sub Committee before they are finally sanctioned by the full Committee. It is also the function of these two Sub Committees to examine the annual reports and keep the Committee in touch with the progress of each scheme.

TECHNOLOGICAL LABORATORY.

39 Details of the work carried out at the Technological Laboratory during the year will be found in the report of the Director which forms Chapter VI of this report. Whilst the resources of the Laboratory continued to be

availed of as in the past by agricultural officers in assessing the spinning value of their new strains, mills utilised to a much greater extent than in the past the facilities afforded by the Laboratory for the testing of their samples or the solution of their problems. The number of samples, lots and yarns spun in the Spinning Laboratory during the year under report recorded an increase of 24, 20 and 0.5 per cent respectively over the figures for the previous year. Samples are tested at the Laboratory under the following groups:

(a) cottons, (c) trade

samples represent

cultural Departments and also some old types grown in connection with certain field experiments. The number of samples tested under this head was 330 against 251 in the preceding year. (b) The standard cottons mostly represent the improved varieties which now cover about 15 per cent of the total area under cotton cultivation in India and they at present include the following ten varieties — *Punjab American 289F*, *Verum 262* (Nagpur), *Verum 262* (Akola), *V 434* (Akola), *Late Verum* (Nagpur), *Umri Bani*, *P*

average quality of different varieties of Indian cotton which form the bulk of the cotton crop, and (ii) those supplied under arrangement with the Bombay and Ahmedabad Millowners' Associations and which represent the early arrivals of the various Indian cottons into the local markets. Altogether 18 samples of the first category and 22 of the second were tested during the year and the results were published in 2 or 3 page circulars which were widely distributed to the trade and industry both in this country and abroad. A new feature introduced during the year was the compilation of all these circulars in the form of a bulletin for ready reference which was published for the first

Varieties of Indian Cotton

In addition to these

in their private capacity were also tested, as in the past, on payment of the fees prescribed by the Indian Central Cotton Committee. The number of such samples tested and reported upon during the year was 127 as compared with 39 in the previous year, this increase would seem to justify the conclusion that the practical value of the Laboratory is being gradually realised by the trade. Other

during the year were compression on the spinning quality of cotton

quality of cotton and the deterioration of cotton stored in the open and in sheds at Karachi. (d) Technological samples comprise those samples of cotton tested at the Laboratory in connection with certain research problems.

A brief account of some of these will be found in the Director's report. Side by side with the work of the Spinning Laboratory, problems are being investigated in the Research Section of the Laboratory, details of which are also given in the report of the Director.

The Moisture Testing Section carried out tests on 24 samples received during the period under review, 2 of which were on behalf of the Appeal Committee of the East India Cotton Association and 11 for the trade; the remaining 11 were in connection with Laboratory investigations

INSTITUTE OF PLANT INDUSTRY, INDORE.

40 The Annual Progress Report for the year ended 30th June 1936 of the Director, Institute of Plant Industry, Indore, with the exception of Section 10 which deals with crops other than cotton, is reproduced in *Appendix IV* of this report. The Institute which was established in 1924 with the object of providing a central research station for cotton in the black soil area of the Malwa plateau is maintained by annual contributions from the Indian Central Cotton Committee and the member States in Central India and Rajputana. Although the interests of the Committee are confined mainly to cotton and those of the States to specific crop problems of their own and the dissemination of more efficient agricultural practices, the interests of both parties are complementary and are harmoniously balanced in the work of the Institute. The Committee and the member States are represented on the Governing Body of the Institute in proportion to the grants made by them, in the financial year 1935-36, the Committee's contributions to the Institute amounted to Rs 97,600 against Rs 67,335 of the member States. On this basis, the Committee is at present represented by nine members on the Governing Body against 5 representatives of the States. The programme of work of the Institute covers the following lines:

GRANTS-IN-AID.

SCHEMES IN PROGRESS IN PROVINCES AND STATES

MADRAS PRESIDENCY.

41. The *Herbaceum Scheme* is [one of the oldest] schemes which commenced in 1923. Its original object was to obtain from local *Uppam* (*G. herbaceum*) suitable types to replace *Karunganni* (*G. indicum*) in 'Salems' and 'Tinnevellys' tracts where rainfall is low and uncertain. In years of good rainfall *Karunganni* gives a much higher yield than *Uppam* but in bad years the position is reversed, *Uppam* being a hardier variety capable of giving a fair yield even under adverse climatic conditions. The cultivator meets the situation by growing a mixture of the two cottons. The *Karunganni* strains which are now being distributed by the Agricultural Department upto 26's warp counts against 14's of the scheme therefore was to produce *Uppam* which could spin at least upto

20's It was, however, realised after 7 years' work that the chances of obtaining pure strains from *Uppam* that would come up to the standard were few and the Committee therefore extended the scheme in 1930 for a further period of five years for securing by hybridisation what was not possible by unit selections

The new line of work has already produced promising results. Of the two hybrid strains, 4803 and 4714, reported last year as promising, the latter has once again proved very satisfactory and that also in one of the most droughty and trying years experienced within the past two decades. In yield it has proved superior to *Karunganni* strains and it is capable of spinning upto 27's standard warp. It is also satisfactory from the point of ginning outturn, drought resistance and ability to withstand untimely February rains, common to 'Salems' and 'Tinnevellies' tracts. It has, however, the disadvantage of being a narrow lobed variety which is likely to be mistaken for *G. roseum*. Attempts are being made to isolate broad-lobed mutants which recur every year in this strain.

The work on purification of selections from other crosses was continued as usual.

42 *Pempheres and Physiological Scheme*—This scheme seriously commenced work only in February 1935, though the preliminary investigations were started in 1931 pending the return of the two officers deputed for special training in England in plant physiology and bio chemistry before they were appointed as Physiological Botanist and Bio chemist respectively under the scheme. The principal object of the scheme is, as finally decided by the Committee in January 1935, to minimise by breeding and physiological methods bud, flower and boll shedding in *Karunganni* (*G. indicum*) caused by untimely rains and to devise control measures against the cotton stem borer, (*Pempheres affinis*), a serious pest in all Tamil districts (Tinnevelly, Salem and Cambodia tracts) and to some extent in the Vizagapatam district. The incidence of the pest varies in inverse proportion to the length of the close period between two cotton crops and also cottons grown under drier conditions seem to suffer less than those receiving irrigation or inter-

Our species of parasites, a
during the survey of the
or and no parasite has so
far been observed on the egg, pupa and adult stages. The four parasites
put together do not seem to account for more than 5 per cent. of the mortality of the larvae but under favourable conditions the Braconid parasite
may give better results.

The work of the year on botanical research shows that of the large number of varieties of cotton tested, only four, viz., *Quebradinho*, *Verdeto*, *Moco* and *Bourbon*, suffered low mortality from the pest. Local varieties, barring *Nadam*, suffered more than *Co 2* (*Cambodia*) when they were grown under similar conditions and their comparative freedom from the pest is

probably due to local rotations and late sowing. The most interesting feature of this year's observations is that *Quebradinho*, *Verdavo* and *Moco* produced gum more readily in the attacked parts killing the larvæ before they reached adult stage and emerged out of the plants. They are, however, late in maturing and poor in yield compared with *Co 2*, but they may prove useful for breeding tolerant types.

The bio chemical investigation shows that the gum formation in the attacked plants is due to the bacterial activity and is associated with the carbohydrate make up of the plant. It has been further ascertained that the three varieties of cotton which produce gum readily are richer in water soluble polysaccharides in early stages of growth than the varieties that do not readily produce gums while the reverse is the case in the later stages. If these findings are confirmed the breeding work may become easier and more precise.

43 Fodder Choram Scheme.—This scheme was started in 1931 with a view to ascertain the causes of the harmful effects of *Choram* (*Andropogon sorghum*) as compared with those of *Cumbu* (*Pennisetum typhoideum*) on the succeeding crop of cotton in the black cotton soils of Tinnevely district and to find out suitable remedial measures in order that the cultivators of this district might have their *choram* fodder without suffering any loss in the yield of the succeeding cotton. The results obtained during the year once again indicate that *choram* does not exhaust soil any more than *cumbu* though in *choram* soils clay contents tend to increase with the crop growth. The study on the changes in the cationic composition of the clay in soils was continued and the results once again show a general tendency to a rise of exchangeable sodium and corresponding fall in magnesium in *choram* plots as compared with *cumbu* plots. Mention has been made in previous reports that the harmful effects of *choram* crop on the succeeding crop of cotton are not noticed if the former is cut at the shot blade stage and that the prevention of grain formation by topping the plants at the flowering stage, by sowing the crop late and harvesting it at the shot blade stage at the normal harvesting time and by thick sowing results in low yield of fodder which the cultivators cannot afford. With a view, therefore, to find out a suitable mixture of *choram* and p without lower . . . : . . . am were tried . . . - . .. next year.

satisfactorily. *Nadani* being a perennial cotton serves as a breeding ground for

the stem weevil and pink boll-worm during the close period of *Cambodia* prescribed by the Madras Pest Act, and if an annual variety suitable for light soils of the two districts is secured it will be possible to extend the Pest Act to the whole of *Cambodia* tract without exception and thus avoid damage to *Cambodia* cotton .

The work of the year under report gives again an indication of the possibility of securing suitable annual types which could replace *Nadam*. A large number of selections from *Co 2* (*Cambodia*) and *Nadam* and crosses between *Co 2* and *Bourbon*, *Co 2* and South African cottons, *Bourbon* and South African cottons, *Nadam* and *Karunganni* and *Nadam* and *Karunganni* back crossed with *Karunganni* were tested and the results obtained from some of the crosses between *Co 2* and *U 4* (South African) and *Co 2* and

	all plots
	60 lbs
	rd year
from <i>Nadam</i> <i>Cambodia</i> also gave good results when it was given a spacing of 18' x 9'	

BOMBAY PRESIDENCY

45 *The Broach Cotton Breeding Scheme*, which has now completed its fourth year, has for its object the breeding of suitable types of cotton for the

high ginning outturn . Of the eight *F1* to *F5* crosses critically studied

were also fairly uniform for economic characters such as yield, ginning outturn, staple length and fineness of fibre . All these cultures will be further tested on a large scale next year for purity of characters . Most of the crosses examined last year were re crossed with *BD 8*, one of their parents, with a view to increasing rapidly homozygosity for high wilt resistance and spinning qualities

Of the single line selections *NS 12* maintained again its previous record of wilt resistance and other economic characters

46 *Jalgaon Cotton Breeding Scheme* — This scheme, like the above, commenced in April 1932, with a view to secure by unit selection or hybridisation suitable wilt resistant types with heavy yielding high ginning and good spinning qualities to replace local *NR* and *Banilla* in Khandesh . *Banilla* is superior to local *NR* in ginning outturn and spinning characters and gives better return to the cultivator . It is, however, susceptible to wilt and has also deteriorated in spinning quality since it was first introduced

The three selections, *N V 57 7*, *N V 56 3* and *N V 56 17*, which were reported as promising last year, have maintained again this year their superiority almost in every respect over *Banilla*, *N R 6* and local *N R*. Of the three new selections, *N V 56 3* is better drought resistant and more vigorous in growth and also gives higher ginning outturn than *N V 57 7*, the next best. It spins up to 40's against 41's of *N V 57 7* and 35's of *N V 56 17*. The highest spinning capacity of *Banilla* varies from 10's to 15's while *N R* spins only upto 7's.

Many other new promising selections are under severe tests for wilt resistance.

47 *The Scheme for Survey of Goghari Cotton in Gujerat* is the outcome of the Committee's policy to establish 1027 *A L F* to the exclusion of all other varieties of cotton in the tract lying south of the Nerbudda. A seed scheme was accordingly started in 1934 for rapid expansion of 1027 *A L F*. Subsequent experience, however, revealed that to achieve the Committee's object within a reasonable time it was necessary to start a campaign against *Goghari*, an inferior short staple variety which was favoured by ginners because of its high ginning percentage. A separate scheme for the survey of *Goghari* cotton was therefore started in January 1935 with a view to trace this cotton to ginneries and induce their owners to discourage its cultivation by refusing to pay high prices for it. During the year under report 93 villages were surveyed in Jalalpore, Bardoli and Ankleshwar talukas and the results show that due to the active propaganda during the past two years there was a marked decrease of the area under *Goghari* this year except in a few villages in Ankleshwar taluka. The total area under *Goghari* and its mixture came down from 1,813 acres last year to 660 acres this year. The ginowners also were more reasonable than last year and co-operated with the Department of Agriculture by ginning pure and mixed *Goghari* separately and disposing of the seed in such a way as it would not be used for sowing.

Now that legislation has been passed by the Bombay and Baroda Governments prohibiting the cultivation, mixing or possession of *Goghari* cotton in Gujerat and that it has been brought to the notice of the cultivators by intensive propaganda, it is hoped that this cotton will completely disappear within the next one or two years.

48 *Plant Puller Propaganda Scheme in Surat and Broach Districts*—This scheme is the result of the Surat Boll worm Clean up Scheme sanctioned in 1930 for the purpose of bringing home to the cultivator in Gujerat the advantages of uprooting cotton stalks and stubbles before the end of May and thus depriving the pink and spotted boll worms of the food material till the next crop of cotton. The clean up scheme clearly demonstrated that by removing cotton stalks and stubbles in time the cultivator would obtain 25 to 30 per cent more yield and on the termination of the scheme in 1934

the Committee sanctioned the Plant Puller Propaganda Scheme, with a view to popularise the cotton plant puller, a cheap and effective implement for uprooting cotton plants

During the year under report the propaganda work continued on the same lines as in previous years, viz, by means of public lectures, magic lantern shows and practical demonstrations. Due, however, to severe damage to the cotton crop by frost in January 1935, and to the action taken by some of the cultivators to grub the damaged crop with the local harrow, it was not possible to sell more than 739 plant pullers against 1,536 last year in Surat district and 2,271 against 3,441 in Broach district. The area uprooted was 56,000 acres or 20 per cent of the total area under cotton in Surat district and 143,296 acres or 62 per cent in Broach district.

49 *Scheme for Defibration of Cotton Seed*—The installation of the defibrating machine having been completed in January 1936, preliminary tests were commenced in the latter half of February. The quantity of seed treated was only 6,720 lbs, but the results indicate that defibration of local seed is not an economic proposition. The experiment will be repeated next year.

SIND.

50. *The Sind Physiological Scheme* was commenced in July 1927, with the object of ascertaining the optimum sowing time and irrigation and manurial requirements of cotton so that the Department of Agriculture might be in a position to advise the cultivator authoritatively on these points by the time the Sukkur Barrage was opened. In 1932 it was definitely concluded that March 15th to May 15th was the optimum sowing period for cotton under irrigated conditions in Sind and the investigation of the remaining two points, viz., the irrigation and manurial requirements of cotton, was continued. The work of the year under report is again a repetition of what was done during the past two years and the results obtained are once more in conformity with those of previous years. The irrigation experiments

The manurial experiments have proved again that the application of manure to cotton is a profitable concern in Sind and that satisfactory returns can be expected when compost alone at the rate of 15 cart loads per acre before sowing or compost at the rate of 7½ cart loads per acre before sowing followed by ammonium sulphate at the rate of 50 to

100 lbs per acre $1\frac{1}{2}$ months to $3\frac{1}{2}$ months after sowing was applied. Best yields were obtained when the quantity of ammonium sulphate was increased to 200 lbs in addition to the basal application of compost.

PUNJAB.

51 *Botanical Scheme*—This scheme was started in 1925 with the object of enquiring into the causes of the periodic failures of *American* cotton in the Canal Colonies and obtaining suitable types of *American* and *Desi* cotton to replace the 4F and *Desi* cottons respectively. In view, however, of the immediate economic value of the improved types of cotton efforts are being concentrated on the problem of breeding and as will be seen below a separate physiological scheme has since been sanctioned for the investigation of the more difficult question of periodic failures of *American* cotton.

It was reported last year that after extensive trials under different conditions of soil and climate 43F, the best of the new *American* types, was finally selected for general distribution in place of 4F. During the year under report it again maintained its superiority over the three old types, 4F, 289F and *L S S* and gave satisfactory yields on an area of 6,000 acres under ordinary field conditions. It is expected to extend over 25,000 acres in 1936-37 season.

38F, another promising strain of *American* cotton, is gaining popularity in drier parts of the province where *jassid* is not a serious pest. It did well at Khanewal and also in Nabha State where in one *pargana* it is reported to have given a high average yield of 16 maunds per acre.

One other new strain of *American* cotton, 47F, which is still under final tests appears to be superior even to 43F in respect of yield, ginning out-turn and hardiness and is capable of spinning upto 50s standard warp counts.

Of the *Desi* varieties, 39M, which was also issued last year for distribution to the cultivators, is reported to have given during the year satisfactory yields everywhere it was grown on commercial scale. A large number of pure line and hybrid strains are under final tests.

52 *The Physiological Scheme*, as mentioned above, has for its object the investigation into the causes of the periodic partial failure of the *American* cotton in the Punjab and it commenced work in March 1935. This failure was in the past attributed to heat stroke, unfavourable combination of climatic and soil factors, white fly and *jassid* attack and concentration of salts in the feeding zones of the roots, though none of these theories was supported by scientific data. The first symptoms of the complaint were the reddening and bronzing of the leaves at the reproductive stage and as

similar symptoms in other crops had been shown by various workers to be due to nutritonal disorders, the present investigation was commenced with manurial tests with magnesium, manganese and iron salts which gave no significant results. The next line of attack, viz, the study of the internal structure of the plant, has given some striking results, revealing certain abnormalities in the leaf, stem and root which are probably responsible for defective boll-opening. In the case of the leaf, the symptoms are characterized by a yellowing of the leaf, which is due to a breakdown of the chloroplasts, the production of excess starch in the later stages the reddening of leaf due to the presence of anthocyanin pigments. In the root the first symptoms of abnormality is the brownian movement of very small particles, which aggregate in cells and form colonies covered with yellow mucilaginous mass. Later on these masses darken in colour and increase in numbers. They are situated in the cortical region and in the phloem. Another change which takes place in the root cells is the formation of deposits in the cortex and the phloem which appear to be protein precipitates. Ultimately the whole of the tissue of the bark becomes filled with these deposits which extend into the medullary rays and the xylem parenchyma. The conducting channels for the translocation of plastic material are thus filled with the precipitates of proteins, fats and tannins. Similar symptoms appear in the stem also.

53 *Pink and Spotted Boll worm Scheme*—In 1926 the Committee sanctioned a Pink Boll worm Scheme with the object of ascertaining the causes responsible for the difference in the incidence of the pink boll worm between the Canal Colonies where it is practically absent and the South East Punjab, where its attack on cotton is severe. The Pink Boll worm Scheme came to an end in 1934 when it was replaced by the present combined scheme, viz., the Pink and Spotted Boll worm Scheme, for the continuation of the work on the pink boll worm and the investigation of certain economic aspects of the spotted boll worm. The results of the Pink Boll worm Scheme have been given in previous reports wherein it has been explained that the unequal distribution of the insect is mainly due to the difference in temperature and humidity between different areas. The study of the spotted boll worm pest during the year under report shows that unlike the pink boll worm pest it is more severe at Lyallpur and Multan, representative of Canal Colonies and Western Punjab than elsewhere. The loss due to the pest this year is estimated from the results of the night bagging experiments at 26 per cent in *Desi* (local cotton) and 10 per cent in *4F* (American variety) against 65 per cent and 47 per cent respectively last year.

It was mentioned in the last year's report that in the Punjab cotton sprouts from the previous year's stumps were the only source of food supply to the spotted boll worm for about six weeks from the middle of April. Further survey of food plants during the year under report shows that while this observation holds good so far as the Canal Colonies are concerned, the

same cannot be said of the south eastern, central and sub montane regions where in addition to cotton sprouts other host plants, particularly *Malva parviflora*, *Abutilon indicum* and *Malvestrum tricuspidatum* serve as breeding ground in the off season. It is thus evident that any clean up scheme for uprooting cotton stalks and stubbles to avoid the boll worm pest is not likely to yield satisfactory results unless the other host plants are simultaneously dealt with.

Of the three species of *Earias* (spotted boll worm), viz., *insulana*, *fabia* and *cupreoviridis* met with in the pests, the first being by far the common host plants so far known in the Punjab *ibiscus* *esculentus* and rarely on other plants. *Insulana* and *fabia* remain active throughout the year while *cupreoviridis* hibernates in the form of pupa from October to April.

54 *The White Fly Scheme* was started in 1931 with a view to study the life history of the white fly (*Bemesia gossypiperda*), a small sucking insect that does damage to cotton and other crops and it came to an end in September 1936. The work of the year again confirms the results already obtained on the seasonal history of the pest. The most active period of the pest is from May to September and at the end of this period it migrates from cotton to alternative host plants like *Brassicæ*, *Solanum tuberosum*, *Lycopersicum esculantum* and various weeds on which it passes winter. From March to May it extends to cultivated cucurbits and ratoon cotton and goes back thereafter to the new cotton crop on which it establishes itself once again. Infestation was found higher again this year on *Mollison*; than on the *Punjab American* types and was reduced to some extent when ammonium sulphate was applied to the crop early in the season.

The chemical analysis of the affected and unaffected plants shows little difference in their nitrogen content till about the second week of July. Thereafter till the end of August the unaffected plants contain more nitrogen than the affected ones. The total quantity of nitrogen produced in a season in an unaffected plant amounts on an average to 1.20 grams against 0.95 grams in an infested plant and also the percentage of nitrogen transported from the vegetative to reproductive organs of the affected and uninfested plants is estimated at 12 and 20 respectively.

55 *Root Rot Scheme* — This scheme commenced in 1932 for the investigation of root rot in the Punjab, where, particularly in the canal irrigated areas, the annual damage done to cotton by this disease is estimated at Rs. 16 lakhs. Both *Desi* and *American* varieties are equally susceptible to this disease which makes its appearance towards the end of June when the crop is 6-8 weeks old and continues up to the middle of September. The disease is, however, practically harmless on any cotton grown under rainfed conditions.

and its activity seems to vary directly in proportion to the number of irrigations or the amount of moisture in the soil. It affects cotton and many leguminous crops but cereal crops like *Maize* (*Zea mays*), *Bayree* (*Pennisetum typhoides*) and *Jowar* (*Andropogon sorghum*) are free from its effects though the causal organisms, *Rhizoctonia bataticola* and *Rizoctonia solani* are present on their roots. The two organisms are carried over from year to year in live as well as decayed roots unlike the American root rot fungus (*Phymatotrichum omnivorum*) which lives only in live roots.

There is no type of cotton, *Desi* or American, in the Punjab at present which can resist the attack of root rot. Some of the plants of *Desi* and American types which appeared unaffected in a severely infested plot were selfed in 1934 and their progeny was tested in 1935. The results show that they were only escapes and not resistant to the disease. All the plants which looked again unaffected like their parents were selfed and such of them that had their roots free from the root rot organisms have been selected for further tests.

The physiological investigation of the two causal organisms give an indication that the application of ammonium salts might prove useful to minimise the disease but the results require further confirmation. Some interesting results have also been obtained from the study on the effect of temperature and hydrocyanic acid gas on *sclerotia*.

CENTRAL PROVINCES

56 *Botanical Scheme* — This is one of the Committee's earliest schemes sanctioned in 1923 for the purpose of obtaining wilt resistant, high yielding and fine spinning types of cotton suitable for the Central Provinces and Berar. This scheme, unlike other schemes, had the advantage of the cotton selection work already started by the Agricultural Department before it was sanctioned and it was therefore possible to obtain very soon a new type *Verum* 262 which looked at the time satisfactory from every point of view. It was, however, soon realised that this type, being susceptible to adverse climatic conditions, was unsuitable and attention was therefore directed to the selection of new strains free from this defect and if possible with better yielding and spinning qualities. The object has now been achieved and it is only a question of two or three years more when *Verum* 262 is completely replaced by three superior strains, *V-431*, *Late Verum* and *V-438* which satisfy the needs of the different cotton growing areas of the province. They are also expected to replace the local short staple varieties wherever possible.

V-431 has proved its superiority over all other new strains in almost every part of the province under varied conditions of soil and climate. It is prolific, wilt resistant, quick in forming buds and setting bolls and

comparatively low shedding. It has also good lint characters and high ginning percentage. It spins upto 32 s standard warp against 22's of V 262 and 10 to 12 s of local cotton and fetches high premium on *Broach*.

Late Verum suffered considerably during the year under report owing to the early cessation of the monsoon and the total absence of late rains. It is particularly suitable for areas where the monsoon lasts till late in the season. It has nearly all the desirable characters of V 434 and spins upto 36's standard warp.

V 438 is specially suitable for soils of lighter descriptions and is expected to cover soon a large area in Nimar district. Its lint is almost as good as that of V 434.

Of the other new strains under tests, *Buri A K* special and No 107, the two American types, have done well again and there is already good demand for their seed from Nimar district and many places in Berar. They spin upto 44 s standard warp. Work on *Bani* 306 and *E B* 31 (*indicum* types) continued on the lines of previous years. Six new promising strains have been isolated from them and they are being tested for wilt resistance.

57 *The Entomological Scheme*, which commenced in June 1934, has for its object the preliminary survey of the cotton boll worm pest in the Central Provinces and Berar where it has been doing much damage to cotton with a view to ascertain its incidence, method of carry over and the extent to which the results obtained from the Surat Boll worm Clean up Scheme can be usefully applied to this province. The work of the past two years shows that three types of boll worms viz, the spotted boll worm (*Earias fabia*), the pink boll worm (*Platyedra gossypiella*) and the cotton boll worm of America, locally known as gram caterpillar [*Heliothis (chloridea) obsoleta*] are the cause of much damage to the cotton crop in the province. The spotted boll worm is last week of July when the cotton begins to feed on the crop till about the middle of August. The pink boll worm feeds on the tops of seedlings and later on the bolls. During the year under report the population of the spotted boll worm remained low till the middle of October and thereafter it began to increase till the end of November when it reached its maximum. With the beginning of December the population began to decline gradually till it reached the lowest level at the end of January. As the time of boll development coincides with the maximum increase of the population of the spotted boll worm the damage done to cotton by this insect is serious.

The pink boll worm is not, on the other hand, a serious pest in the Central Provinces and Berar. It appears from September onwards and its maximum population is reached sometime in January. As the pink boll worm, unlike the spotted boll worm, prefers mature bolls to buds and

tender bolls and also as its maximum population is reached when all the cotton pickings are over, the damage done by this insect is not serious

The gram caterpillar was hitherto unknown in India as a cotton pest and it has been found out this year for the first time that the damage done by it to cotton in Berar is as serious as that of the other two boll worms. Like the spotted boll worm, the gram caterpillar begins with boring the tender shoots of bolls when they are fo end of October when ere after temporarily the gram crop

As regards the carry over of the three boll worms, the last picking of cotton is usually over by the month of January and there is an interval of nearly six months between the old and next new crop. The boll worms have however no difficulty in tiding over this period as according to the local practices of cultivation cotton plants in many localities are not removed off the fields till about the middle of May. In May and June the supply of food in cotton fields becomes scarce and during this period they live on the available alternative food plants such as *Hibiscus esculentus*, *H. panduratus*, *H. cannabinus*, *Abutilon* spp., hollyhock and perennial cotton trees.

The foregoing account shows that the position of the boll worm pest in the Central Provinces and Berar is about the same as in Gujerat and the only practical way of controlling it is to adopt clean up measures similar to those adopted in Gujerat, viz., the uprooting of cotton stalks and stubbles and eradication of alternative host plants as early as possible after the harvest of cotton.

UNITED PROVINCES

different cotton growing areas of the province. The survey was continued during the year in Moradabad, Naini Tal and Bijnor districts of Rohilkhand Division and representative samples were collected from no fewer than 2,479 villages. The examination of these samples show that the pre dominating type of this tract is a narrow lobed, yellow flowered variety with varying quality of lint. White flowered variety is comparatively rare and broad lobed white flowered type is rarer still. 1,321 of these samples have been retained in a preliminary selection and only the promising few of them will be tested next year.

The single plant cultures of the selections made out of the material collected in 1933 from Rohilkhand districts were tested during the year

and all promising plants were selfed and their ginning percentages were worked out. The unselfed plants of all cultures were also picked and examined for quality of lint and the best of them were retained for testing their ginning outturn next year. A large number of single plant cultures selected out of the material obtained in 1934 from Bundelkhand districts and adjoining States were likewise tested and all the promising plants were selfed for further tests.

BENGAL

59 *The Comilla Cotton Scheme* has for its object the botanical and systematic study and improvement of the commercial grade of *Cernuum* cotton and was started in December 1934. The work of the year mainly consists of testing the field and commercial characters of the single plant selections obtained last year from different types of *Comillas* and Assam cottons and making as in last year further selections from the cultivators' fields. Reciprocal crosses were also made with two local types and *Garrow Hill No 6*.

BURMA

60 *The Cotton Improvement Scheme* was started in April 1931, with the object of bringing home to the cultivators of the *Wagale* tract, by means of practical demonstrations, the better methods of cotton cultivation. The Committee provides funds for the employment each year of not more than 24 demonstrators and for the purchase of the necessary implements for demonstration. During the year under report there were 24 demonstrators

of cultivators conserving manure and the area under improved layout have considerably increased since 1931 when the scheme was started.

HYDERABAD

61 *The Botanical Research Scheme* commenced in 1933. It is with a view to good spin. with on in Hyderabad State. *Gaorani* or *Bani* is probably the best of the indigenous cottons from the point of spinning. It is, however, poor in yield and Local Government by now, completely neglectums.

The work of the year mainly consists of testing old and new strains and making new single plant selections from *Gaorani* mixture and short staple

varieties There were four varietal tests, two for the comparison of *Gaorani* or medium staple strains intended for the *Gaorani* tract and two of short staple strains for the short staple areas of Parbhani and Aurangabad districts. In one of the first two tests which was repeated at Parbhani, Nanded and Mudhol the combined results show that all the old strains tested, viz, *G 4*, *G 6*, *G 55* and *P 25* are about equal to one another in yield and superior to the local *Gaorani* mixture in every respect. In the second test at Parbhani with the exception of *G 6* and *G 69* all other strains, viz, *G 4*, *G 3 B 1*, *G 58 E* and *P 26* gave higher yields than the same control *Gaorani* mixture. *G 6*, an early maturing variety, suffered more than other varieties from abnormal weather conditions and heavy boll worm attack. In the remaining two tests *Havri 3*, a *roseum* strain, proved again a better yielder than all other strains tested. There were two other similar tests between a large number of new strains and a few old ones. The results show that of the 29 new *Gaorani* strains tested four, viz, *G 4 B*, *G 4 B $\frac{1}{2}$* , *G 4 B 5* and *G 58 A 1* are likely to prove satisfactory while none of the new short staple strains come up to the level of *Havri 3*.

G 4 and *G 6*, which have given very promising results in comparative trials during the past three years, were tested this year side by side with *Gaorani* mixture as control in cultivators' fields. *G 4* failed for some reason or other to compete successfully with the control while *G 6* fared better. *G 4* and *G 6* were also tested on a commercial scale on 900 and 500 acres respectively in Nanded district. Here also *G 4* failed to come up to the expectation while *G 6* gave satisfactory yield. *G 4* and *G 6* spun up to 33 s and 40 s warp counts respectively.

62 *The Pink and Spotted Boll worm Scheme* was started in January 1933, with a view to ascertain (a) the actual amount of damage done to cotton in the Godavary valley by the boll worm pest, (b) the progress of its attack on the growing crop, (c) the mode of its carry over from season to season and (d) the effect of the likely control measures. The work of the year under report is more or less a repetition of what was done during the last year and consists of (a) a survey of the incidence of the boll worm attack and damage done by it to the harvested crop and (b) the study of the behaviour of the full fed larvae of pink and spotted boll worms and the manner the boll worm pest is carried over from one season to the next. The results show that as observed during the last year, the spotted boll worm is practically never absent and rapidly increases in numbers in September and October, when the weather conditions are favourable. The maximum incidence of its attack is attained in December. The maximum incidence of its attack is attained in December about the middle of February during the off season on cotton host plants and pupates in cotton parts and in the soil. The damage done by the spotted boll worm during the year amounted to 10 to 28 per cent of buds, 20 to 58 per cent of green bolls and 7 to 8 per cent of kapas.

The pink boll worm pest makes its first appearance from June onwards and reaches its maximum incidence in January February when it begins to decrease till it becomes negligible at the end of April. It continues as short cycle larvæ on "stand over cotton" till the beginning of May. Thereafter it spends a short time in the quiescent stage and emerges as long cycle moth on the return of favourable weather after the setting in of the South West monsoon. The long cycle moth finds ready breeding ground in the previous year's crop still left in the fields in many localities.

survive in the stored seed. The damage done by this insect is estimated at 14 to 35 per cent of the yield.

The gram caterpillar, *Heliothis (Chloridea) obsoleta*, which has been found to be causing much damage to cotton in the Central Provinces and Berar, has not yet attracted much attention in Hyderabad State.

BARODA.

63 *Root Rot Scheme*—This scheme was started in February 1932 with the double object of studying the root rot disease and securing a few suitable strains of cotton which are resistant to this disease. The work of the past four years shows that the disease is less severe in years of normal rainfall than in years of high rainfall and also in late sown crop than in early sown crop. The affected cotton roots contain the organisms of *Macrophomina phaseoli*, *Nemas* and some *Fusaria* which are also found in several other crops and weed plants suffering from similar disease, but the infection experiments show that while the first two organisms are the real cause of the disease, the *Fusaria* are practically harmless. The activity of *Macromum* at 36° C. Sucrose appears has retarding effect, but *Sclerotia* when they are exposed to liquor however killed when exposed to

formaldehyde

On the Botanical side, five selections, viz, *KS*, *BS*, *DS*, *No 8* and *No 9*, are found more resistant to root rot than the control and no significant difference has been noticed between themselves, though *KS* looks a little more promising than the rest.

64 *The Goghari Cotton Survey Scheme* is similar to the *Goghari Cotton Survey Scheme* in the Bombay Presidency and has for its object the survey of *Goghari* cotton crop in Baroda State, with a view to trace the produce to ginneries and induce them to gin it separately and dispose of the seed for cattle food. During the year under report the survey was again confined to the same four talukas that were dealt with last year, viz, Navsari, Mahuva, Palsana and Gandevi, though the number of villages was increased to 118.

from 95 of last year. The total area surveyed was about 55,000 *bighas* (32,353 acres) belonging to 6,409 cultivators, and only 85 of the latter, all in Navsari taluka, were found growing *Goghari* as more than 5 per cent mixture. Nowhere in the remaining three talukas did the *Goghari* mixture exceed 5 per cent, while in Gandevi taluka the entire cotton crop was practically free from it. A list of the names of cultivators who grew more than 5 per cent mixture was circulated to the ginowners who had undertaken to gin such cotton separately and sell the seed for cattle food. The Bombay Cotton Control Act has been applied to the Baroda State, with necessary modifications and omissions, to meet the requirements of the State. This will, it is hoped, effectively check, if not completely eliminate the menace of *Goghari*.

65 *Plant Pullers*.—In January 1922, the Government of Bombay

and effective implement for uprooting cotton stalks and stubbles and thus encourage the cultivators to fight against the boll worm pest by cleaning up their cotton fields as soon as the last pickings of *kapas* (seed cotton) were over. The work was started in Baroda and Navsari districts on the same lines as in Broach and Surat districts of the Bombay Presidency, and as a result of intensive propaganda, it was possible to distribute 3,000 plant pullers in Baroda district and 577 in Navsari district. The demand in Baroda district was so great that it could not be met by the manufacturers and many more plant pullers would have been sold if they had been available. In Navsari district, on the other hand, the demand was low due to the propaganda being started late and also to a feeling among the cultivators that by uprooting cotton plants the physical texture of the soil is interfered with, the low demand was also due to the plant pullers being purchased in the adjoining villages of the Bombay Presidency by some of the cultivators.

BIKANER.

66 *The Gang Canal Scheme*.—The opening of the Gang Canal under the Sutlej Valley Scheme resulted in the colonization of a new and practically uncultivated area, now known as the Gang Canal area, with immigrant peasants mostly from the Punjab who had been accustomed to the cultivation of the Punjab *Desi* and American types of cotton. The local conditions being different from those obtaining in the Punjab with regard to the supply of irrigation water which proved uncertain, it was feared at one time that the area under cotton would be seriously reduced. It was therefore considered necessary to sanction this scheme for the purpose of studying the local problems of agriculturists and obtaining by selection or hybridization one or more superior types of cotton suitable for the locality. The scheme

that *Cawnpore 520 (Desi)* is the most profitable variety to grow in this locality. *Cawnpore 520* is superior to *Mollisoni (Desi)* in every respect and arrangements are being made for the multiplication and distribution of its seed. It gives best results when it is sown in the middle of May though its sowings could be extended till the latter part of June without any loss in yield, June sowings however slightly lower the ginning outturn. It also does not require much watering and gives normal yield with as few as four irrigations when they are suitably adjusted. It will thus be seen that the usual short supply of water in the hot weather need not prevent the cultivators from sowing as much cotton as they wish on the water then available.

MYSORE

67 The *Doddahathi (American) Cotton Scheme* was sanctioned in February 1935 for the purpose of breeding suitable types from the local *Doddahathi* or American cotton, resistant to "Red Leaf" disease which stands in the way of the expansion of this crop in the Irwin Canal area in Mysore State. The work of the year in the Central Laboratory, Bangalore, indicates that *Co. 2 (Cambodia)*, *Gadag No 1*, 295-F-21, *Ashmouni-37* and *Uganda* varieties are more susceptible to "Red Leaf" than 4-F 98, *Sea Island, Co 1*, *Boss III-16* and *Arboreum* varieties and crosses between *Ashmouni* and *Peruvium*, 4-F. 98 and *Peruvium* and *Sakel* and *Peruvium*. At the Irwin Canal Farm 38-F, 4 F and *M A II* were sown from the 1st May, at 15 days' intervals with a view to find out if there was any relation between the disease and the time of sowing. The results indicate the existence of such relation. A large number of crosses was made during the year between exotic, indigenous and wild varieties and the behaviour of their progenies to "Red Leaf" will be studied next year.

CHAPTER V.

SEED DISTRIBUTION SCHEMES

68 During the first five years of its existence, the Committee devoted itself chiefly to botanical and other research on cotton, but in 1929 it felt that if its work was to be of practical benefit, the results obtained by research should be made easily available to the cultivator. In this year, therefore, the Committee adopted the policy of helping Agricultural Departments and Co operative Sale Societies in the more extended distribution of pure seed of improved varieties of cotton. Since 1929, twenty seed distribution and extension schemes have been sanctioned and of these 17 are at present in operation. Three of the sanctioned schemes for one reason or another never started, one of these has since been withdrawn and the other two have been merged in a larger and more comprehensive scheme. A short account of these schemes is given below.

MADRAS PRESIDENCY

69 *The Tiruppur Co 2 (Cambodia) Seed Extension Scheme* —The Madras (Tiruppur) Seed Extension Scheme was sanctioned in 1929 for a period of five years with the object of providing for the pay of an officer to act as an adviser to a group of Co operative Societies in Coimbatore District which were growing improved strains of Cambodia cotton and also to help the Agricultural Department in their seed distribution work. It started work in May 1931 and was extended in June 1936 for a short period of three months. This scheme was amalgamated in 1933 with a new scheme known as the Tiruppur Co 2 (Cambodia) Seed Extension Scheme which was sanctioned in August 1932 for a period of five years for the distribution of Co 2 seed in the Salem and Coimbatore districts through the agency of the Madras Agricultural Department and the Tiruppur Co operative Trading Society. The object of the second scheme was the maintenance by the Agricultural Department with a grant from the Committee of a seed multiplication area of not less than 6,000 acres, and the distribution by the Society to the cultivators of the pure seed produced in this area for 100,000 acres. The Committee has further guaranteed the Tiruppur Co-operative Trading Society its actual loss on seed transactions up to a maximum of 10 per cent of the capital invested for the purchase of seed and interest thereon at 5 per cent. In 1934-35, the cotton crop in Tiruppur was so badly affected by pests and adverse climatic conditions that it gave only a poor average yield of about 420 lbs of kapas per acre. The total quantity of pure seed obtained from the multiplication areas and selected cultivators was 1,348,171 lbs of which only 1,009,471 lbs were sold for sowing in 1935-36, the rest being disposed of as cattle food.

In 1935-36, the Department of Agriculture issued pure seed for 6 249 acres of seed multiplication area but due to the failure of rains and the inadequacy of water in wells at the sowing season the cultivators utilised it for 5 320 acres only by sowing at a higher seed rate. For the same reasons the yield of cotton is not expected to exceed 250 lbs per acre. That Co 2 is appreciated both by the ryots and merchants is evidenced by the fact that the natural spread of this variety of cotton exceeded 120 000 acres during 1935-36 in addition to the seed multiplication areas. The premium obtained per candy of 754 lbs of Co 2 cotton over local Cambodia ranged from Rs. 7/6 in September 1935 to Rs. 12 in November 1935.

BOMBAY PRESIDENCY

70 *The Hubli Seed Extension Scheme*—The scheme was sanctioned in November 1929 for a period of five years. It commenced work in June 1930 and was extended for one year from the 31st May 1935. It has since been merged in the revised scheme for the extension of *Jayawant* and *Gadag 1* cottons in the Southern Division of the Bombay Presidency. Under the original scheme it was intended that the Department of Agriculture with the aid of a grant from the Committee should maintain a seed multiplication area of about 15 000 acres of *Jayawant* cotton and the Hubli Co-operative Cotton Sale Society should distribute the seed thus obtained to cover about 200 000 acres. In so far as the Society was concerned the Committee agreed to make good to it any losses in its seed business up to a maximum of Rs. 5 000 every year and to pay interest at 5 per cent on the capital invested for the purchase of pure seed. The Committee further granted the Society a loan of Rs. 7 629 free of interest to be recovered from the profits in the seed transactions. During 1935-36 the Department of Agriculture issued 1 600 000 lbs of seed but the area covered was a figure much below the expected from the reserved area 1 100 000 lbs were stocked for distribution in 1936-37. During the season 1935-36 the yield of *Jayawant* cotton was reduced by 25 to 30 per cent on account of unfavourable weather inadequate soil moisture and mist and rains during the picking time in some places. The average price obtained for *Jayawant* cotton was Rs. 11 more per naga (1 344 lbs) of seed cotton than for the local cotton. It has been estimated that as a result of the operation of the scheme from 1930-31 to 1935-36 the total gain to the growers of *Jayawant* cotton in Dharwar district alone comes up to Rs. 6 lakhs per annum.

71 *The Gadag Seed Extension Scheme*—This scheme which started in June 1930 is almost identical with the Hubli scheme except that the type of seed intended for distribution is *Gadag No. 1* and the seed multiplication area is 24 400 acres whilst the work of distribution is done by the Gadag Co-operative Cotton Sale Society. The Committee also granted the Society a loan of Rs. 7,202 free of interest to be recovered from profits in seed

transactions In 1935 36, the Department of Agriculture maintained a reserved area of 25,258 acres and handed over to the Society 1,250,892 lbs

average premium paid for *Gadag 1* over pure unmixed *Dharwar American* amounted to about Rs 25 per *naga* or Rs 3 per acre The total gain to the growers of *Gadag 1* cotton in Dharwar district has been estimated at Rs 4 lakhs annually during the past six years

72 *The Athani Seed Extension Scheme* —The main difference between this scheme and the previous two schemes is that this scheme was run entirely by the Agricultural Department whereas the first two were conducted partly by the Agricultural Department and partly by the Cotton Sale Societies The Athani Seed Extension Scheme which has for its object the extension of *Jayawant* seed in the Athani Taluka of Belgaum District was sanctioned in December 1931 for a period of five years and commenced work in April 1932 During the year, 1935 36, the Department of Agriculture was able to distribute to cultivators 310 283 lbs of *Jayawant* seed to cover an area of 31,028 acres and maintained a seed multiplication area of 5,847 acres from which 350,000 lbs of pure seed were secured and stocked for distribution in 1936 37 *Jayawant* cotton, obtained from the reserved area, fetched a premium of Rs 2 8 to Rs 3 per *Atki* of 200 lbs of *lapas* over local cotton The extra gain to the growers of this cotton has been estimated at Rs 81,033 annually The Athani scheme has worked so satisfactorily that it has formed the basis of the new seed multiplication scheme, viz, the Revised Jayawant and Gadag No 1 Scheme, for the whole division which was started in June 1936

73 *The Revised Jayawant and Gadag No 1 Scheme* —Five separate schemes were sanctioned by the Committee in 1929 for the distribution and extension of *Jayawant* and *Gadag No 1* cottons in the Southern Division of the Bombay Presidency These were the Hubli, Gadag, Athani, Haveri and Bailhongal Schemes The last two schemes could not be started for several reasons whilst the first two indicated certain defects in their working which stood in the way of their continuance after the expiry of their sanctioned periods The revised scheme is designed to embrace not only the areas covered by the five schemes mentioned above but also other areas in Dharwar, Belgaum and Bijapur districts for which there were no specific schemes The revised scheme will be operated from seven centres, viz Hubli, Haveri, Navalgund, Bailhongal, Athani, Bijapur and Bagalkot through the agency of Co operative Societies but under the general control of the Agricultural Department Societies agreeable to the conditions imposed will receive a subsidy not exceeding annas 6 per bag (140 lbs) to meet handling charges and losses incurred by them The keynote of this new scheme which came into operation in June 1936 is decentralisation so that no single agency should have too great an area to cover or too great

a responsibility to carry This scheme has been sanctioned by the Committee for a period of five years at an estimated expenditure of Rs 2,06,772 of which a sum of Rs 88,332 represents the savings of the original five schemes referred to above Sanction to the scheme is subject to the condition that the Government of Bombay should bear 25 per cent of the net additional cost but as the Local Government have agreed to bear their share of the cost for a period of or the policy to be adopted the cost of schemes finan the revised scheme will be in operation for a period of one year only in the first instance ods,

74 *The Surat Seed Distribution and Extension Scheme*—This scheme was sanctioned in 1929 for two years and extended for two more years in 1931 pending the decision of the Committee on the merits of the two rival varieties of 1 A and 1027 A L F. In January 1934 the Committee finally decided to confine its attention to the distribution of 1027 A L F only and extended the scheme for five more years. Thus the scheme will continue till March 1939. Owing to severe frost in the middle of January 1935 and the consequent failure of the cotton crop over a large area in the Surat district, it was not possible to secure more than 1,118,906 lbs of pure seed of 1027 A L F but even all this quantity could not be distributed owing to the unreasonable attitude of the cultivators who attributed the failure of cotton to this seed, to the advice of a few money lenders in favour of *Ahandesh* cotton and to the difficulty experienced by farmers in finding ready money for the purchase of seed. The quantity of seed distributed did not therefore exceed 2,312,818 lbs during the 1934-35 season. The Government maintained a seed multiplication area of 12,828 acres and the seed obtained from this area will be distributed for sowing in 1936-37 season.

has for its sanctioned in May 1931. Proposals for further extension of the scheme for three years from May 1936 were considered by the Committee but its extension was sanctioned for one year only pending the decision of the Government of Bombay on the condition laid down that a part of the cost of the scheme during the remaining two years should be borne by the Government. As a result of the scheme being in operation during the last five years the cultivation of *Banilla* cotton in Khandesh has extended over an area of 130,000 acres with a production of about 30,000 bales. This cotton is susceptible to wilt and has also deteriorated in spinning quality since its introduction. In spite of these defects, however, it is superior to local cotton and gives better returns. In 1935-36 pure *Banilla* fetched a premium of Rs 10 to Rs 15 per candy over local cotton. Spinning tests on *Banilla*

cc
B
tl

Farms persistently declined in spinning quality during the last two years. During 1935-36 the Department of Agriculture maintained a controlled area of 20,112 acres and distributed for general cultivation 9,65,000 lbs of pure seed obtained from the previous year's crop.

76 *The Deccan Canals (Banilla) Seed Extension Scheme*—This scheme for the supply of pure *Banilla* cotton seed for the Deccan Canals area was sanctioned in January 1934 and started work in April 1934 in the Government Farm at Kopergaon. Unlike other seed schemes this scheme is expected to be self-supporting. Of the sixty acres of farm land taken on lease, *Banilla* occupied in 1935-36 a little over 30 acres, the rest of the area being cropped with Spanish peanut. Cotton suffered considerably from and low rainfall and other adverse conditions and gave a total yield of 22,378 lbs of seed. All the kapas was ginned on the Farm and out of the total quantity of 10,700 lbs of pure, healthy seed obtained, 10,000 lbs were distributed to cultivators and the balance was retained for sowing on the Farm in the following year. Groundnut gave an average yield of 1,630 lbs per acre. In the irrigated Deccan Canals areas *Banilla* gives as high an yield as local *N R* and fetches a good premium over the local variety. The total area expected to be covered by this cotton is 30,000 acres.

77 *The B D 8 Seed Extension Scheme*—This scheme for the distribution and extension of *B D 8* cotton seed was sanctioned in August 1935 for a period of 3 years and commenced work in December 1935. From a field survey undertaken by the Department of Agriculture at the beginning of the scheme it was ascertained that an area of 3,023 acres was under pure *B D 8* cotton which yielded 474,534 lbs of pure seed and 252,032 lbs of lint and the latter fetched a premium of Rs 40 to Rs 53 per *handy* of 784 lbs of lint over *Broach* cotton. The difficulties in the way of expansion of this cotton are the tendency on the part of buyers to underestimate the value of its lint, its low ginning percentage and the absence of a well organised cotton market for *Broach* staple cotton. Cultivators, however, are in favour of this cotton because of its high yield of *kapas* and wilt resistance.

SIND

78 *The Sind Seed Distribution and Extension Scheme*—The Sind Cotton Extension Scheme commenced in April 1931 and on the expiry of its first sanctioned period of 3 years it was extended for a further period of 5 years. The work of the past five years has definitely proved that the Right Bank area of the Indus is as suitable as any other part of Sind for growing long staple cotton and it is now proposed to pay hereafter special attention to seed distribution, the introduction of better methods of cultivation, and

the extension of cotton in lands under the Barrage area. Cotton cultivation was unknown on this side of the Indus before the commencement of this scheme but as a result of the intensive propaganda carried on by means of field demonstrations, shows, public meetings, etc. the area under cotton has now gone up to 17,000 acres against 4,000 acres in the previous year and 25 acres in 1931-32. During the year under report there were 40 demonstration plots on the Right Bank area for the comparison of 4-F 98 and Sind Sudhar (289 F 1) and contrary to the experience of previous years in most cases the latter gave better yields than the former. Sind Sudhar is the better yielder of the two but being a late maturing variety it suffers more than 4 F 98 from frost. The year under report was milder than usual and was therefore quite favourable for Sind Sudhar. The sowing date experiments showed that the best time for sowing cotton in this area is from the middle of April to the 30th of May. The Agricultural Department distributed on the Right Bank 3965 maunds (326,263 lbs) of pure seed to the cultivators.

On the Left Bank Sind Sudhar having proved definitely during the past four years to be the best suited for Thar Parkar district and the lower portion of Hyderabad district, the comparative tests of 27 W N (*Desi*), were continued during the year under report in the upper part of Hyderabad district only in Hyderabad district while it closely followed the same course as in Nawabshah district. The chief difficulty in extending high quality cottons like *Sea Island* 24 and *Boss III* 16 is the absence of marketing organisation. These two varieties were grown during the year under review on an area of 1,400 acres and they gave an average yield of 7 maunds per acre.

The Department of Agriculture have developed a regular system of seed distribution suitable for the conditions of Sind and on the lines of this system they were able to distribute 7,400 maunds (608,900 lbs) of Sind Sudhar, Sind N R, *Sea Island* and *Boss III*-16 seed. The total area sown to cotton in 1935-36 on the Left Bank was 790,858 acres against 669,100 acres in 1934-35.

CENTRAL PROVINCES AND BERAR

79. *The Verum Seed Distribution and Marketing Scheme*—In November 1930 the Verum Seed Distribution and Marketing Scheme was introduced for a period of one year in the first instance as an extension of Verum 262 cotton and was extended annually till the end of July 1931, when it was replaced by a combined scheme sanctioned for a period of 3 years for the extension and marketing of long staple cotton. During the year 1935-36 the Agricultural Department distributed 4,143½ handies (3,218,501 lbs) of pure seed of long staple varieties sufficient to cover an area of 103,537 acres, whilst 5,591 handies (4,385,698 lbs) of pure seed, obtained from the seed multiplication area of that year, were

stocked for distribution in 1936-37. The quantity of staple cotton disposed of in 1935-36 amounted to 6,823 bales which fetched an average premium of Rs. 42.9 over *Broach* and Rs. 60.4 over *Oomra* equivalent to a premium of 20.82 per cent on *Broach* and 32.26 per cent on *Oomra* which compares very favourably with the figures obtained in all the previous years since 1930-31 with the exception of 1934-35 when the corresponding premia were Rs. 62.3 and Rs. 82.

UNITED PROVINCES

80 *C 402 Seed Distribution Scheme*—This scheme was sanctioned in January 1934 for a period of five years for the distribution of *C 402* seed in the Hardoi, Lucknow and Sitapur districts of the United Provinces and commenced work in May 1935. Though superior to the local cotton this variety requires more careful cultivation and it was therefore decided early in 1935 to restrict its distribution to Madhoganj and Bilgram *tehsils* only where it gives satisfactory results without extra labour and to extend in the remaining areas covered by the scheme another variety *C 520*, which is better suited for them than *C 402*. The latter was grown during the year on an area of about 1,340 acres which gave an average yield of 4 to 6 *maunds* per acre. *C 520* was demonstrated on a total area of about 150 acres in 197 localities and the yield obtained varied from 7 to 10 *maunds* per acre.

HYDERABAD STATE

81 *The Hyderabad Seed Extension Scheme* was sanctioned in November 1929 and started work in March 1930. It was extended for three years in January 1933 and subsequently for a further period of 6 months up to the 31st August 1936. In August 1936 the Committee sanctioned a further extension for 4½ years subject to the condition that at least 50 per cent of the cost should be met by the State. During the first two years of the scheme *Dharwar No. 1* and *Gadag No. 1* seeds were distributed but as a result of the experiments carried out by the Hyderabad Agricultural Department and in view of the fact that the Bombay Agricultural Department had found the *Jayawant* variety more suitable for the neighbouring areas of that province the distribution of *Dharwar No. 1* seed was discontinued in 1931-32 in favour of *Jayawant*. During the year 1935-36 the Department of Agriculture maintained a seed multiplication area of 7,000 acres but due to the failure of cotton crop during the previous year in the area covered by the scheme and consequent dearth of pure seed they were unable to distribute more seed than the quantity required for 41,256 acres. Arrangements have, however, been made to obtain from seed farm areas within the State itself enough pure seed for not less than 35,000 acres in 1937-38 season and purchase the remaining quantity from selected cultivators. The Department of Agriculture have also undertaken to organise the initial stages of seed production in more than one area to minimise the danger of setback in adverse seasons and remain independent of the Bombay Presidency for the supply of pure seed.

BARODA STATE

82 *The Baroda (Navsari Seed Storage) Scheme* — This scheme was sanctioned in February 1933 for a period of five years for the rapid spread of 1027 *ALF* in Baroda territory, and started operations in April 1934. Unfortunately the very first year of this scheme was marked by the occurrence of a serious frost which gave a definite set back to the spread of 1027 *ALF*. Owing to the damage to the cotton crop by frost, scarcity of pure seed was apprehended but the timely step taken by the State Agricultural Department enabled them to secure from different sources 1,350,660 lbs of 1027 *ALF* seed. Of this quantity 147,555 lbs were issued for sowing 4,954 acres of the reserved area and the next year 873,239 lbs were distributed to cultivators. In 1935-36 the reserved area was carefully rogued, the produce obtained from it was ginned under the supervision of the Department and was stocked for distribution of pure seed on a large scale. Mr. Goghari had declined to propagate 1027 *ALF* and so propaganda was continued in favour of the holding of meetings, the distribution of seed, etc. The Department is making serious efforts to make Baroda independent of the Surat Farm so far as seed supply to cultivators is concerned. It is anticipated that in about two years time the machinery for ensuring a steady supply of selfed seed of 1027 *ALF* and its multiplication on a large scale will be in full and effective working order.

RESEARCH STUDENTS

83 The training of research workers in the various branches of the Department is carried out by the Committee ever elected and trained in India and abroad. The Committee's schemes, at the Institute of Plant Physiology and Pathology Laboratory or under the supervision of the Director, are awarded for periods of 1 to 3 years and extensions are granted.

Two categories of scholarships are awarded, viz., training grants and general scholarships. Training grants are intended for Government servants who are recommended by provincial Governments and for Committee servants who are considered suitable. General scholarships are awarded to University Graduates selected by the Research Students Selection Sub Committee. Applications for these scholarships are invited by advertisement in all leading Indian newspapers.

Fifty-four scholarships and eight training grants have so far been awarded by the Committee, out of these one scholarship and five training

grants were for foreign study. During the year under report two scholarships and two training grants were sanctioned, six research students were under training—four in India and two abroad.

At its meeting in August 1936, the Committee decided that in future the Director of the Institute of Plant Industry, Indore, might appoint students for training in cotton genetics at the Institute. The scholarships of these students will be paid by the Committee, but the appointments would be subject to confirmation by the Research Students Selection Sub Committee.

The expenditure on Research Studentships up to 31st August 1936 amounted to Rs 2,52,354.

P H RAMA REDDI,
Secretary

CHAPTER VI.

ANNUAL REPORT OF THE DIRECTOR, TECHNOLOGICAL LABORATORY, FOR THE YEAR ENDING 31st AUGUST 1936.

In the present report an account will be given of the work done at the Technological Laboratory between 1st September 1935 and 31st August 1936. It will be seen from a perusal of this report that during the year under review the Laboratory not only maintained at the previous high level its service to the agricultural officers in assessing for them spinning values of their prominent strains but that its resources were utilised to a much greater extent than in the past by the mills who sent their samples for tests and their problems for solution to the Laboratory. The work done at the Laboratory will as usual be described under the following five heads —

- I Spinning Laboratory
- II Research Laboratory.
- III Moisture Testing Section
- IV Publications
- V General

I SPINNING LABORATORY

The following statement gives a summary of the agricultural samples of different cottons spun and tested at the Laboratory during the period under review together with the names of the suppliers of the samples —

BOMBAY

- (1) *The Cotton Breeder, S M C, Dharwar*—4 samples of Jayawant $\times 15$ crosses, 2 samples of Dh 1 \times Dh 2 crosses and one sample each of Gadag 1 and G1 \times 102 E 4
- (2) *The Cotton Breeder, Jalgaon*—9 samples of Banillas, 7 samples of Local cottons, 3 samples each of N V 57 7 and N V 56 3, 2 samples of N R 6 and one sample of N V 56 17
- (3) *The Agricultural Overseer, Padegaon*—6 samples for irrigation experiments
- (4) *The Cotton Breeder, S G, Surat*—4 samples of selections, 2 samples of Segregates and one sample of Surat B D 8
- (5) *The Cotton Breeder, Viramgam*—2 samples of Segregates, one sample each of frost affected Segregate 4 1 and Wagad 8 and a sample of Wagad Local

- (6) *The Cotton Breeder, Broach*—3 samples of Selections, 2 samples of B D 8 and one sample each of Goghari A 26 and Broach Local
- (7) *The District Agricultural Overseer, Broach*—1 sample of B D 8 (Nabipur)

SIND

- (1) *Botanist in Sind, A R S, Sakrand*—4 strains of 4F-18×Meade, 2 samples of 4F 98 and one sample each of 289F-1, 285F 2, Ashmouni, Boss III, Sea Island and W N 27
- (2) *The Cotton Physiologist, Sakrand*—6 samples of 285F 2 for manurial experiments, 3 samples each of 289F 1 and 4F 98 for irrigation experiments and 2 samples of Red Leaf 289F-1
- (3) *The Cotton Supervisor, Indus Right Bank, Dadu*—One sample each of 289F 1 and 4F 98

PUNJAB

- (1) *The Cotton Research Botanist, Lyallpur*—19 samples of American Varietal Tests, 15 samples of Desi Varietal Tests, 7 samples of 38F for manurial experiments, 18 samples of 4F for irrigation experiments, 4 samples of D C cottons and one sample each of 4F, 289F, 43F and Mollison
- (2) *The Deputy Director of Agriculture, Hansi (Punjab)*—One sample each of 1F, 4F, 43F and 289F

UNITED PROVINCES

- (1) *The Economic Botanist to Government, U P, Cawnpore*—5 samples of C 402, 3 samples of C 520 and one sample each of Local, White Flower and Yellow Flower strains

MADRAS

- (1) *The Cotton Specialist, Coimbatore*—6 samples of Cambodia strains, 4 samples of new strains, Co 2 sample from each of Aduturai and Pollachi and one sample each of Karunganni 546, Uppam and Podupathy
- (2) *The Superintendent, Agricultural Research Station, Koilpatti*—10 samples of C 7 for different experiments, 6 samples of Selections, 5 samples of Koilpatti strains, 2 samples of K P T I and one sample of Perennial

- (3) *The Farm Manager, Agricultural Research Station, Nandyal*—2 samples of Gadag (Local and imported), 2 samples of Co 2 (irrigated and dry) and one sample each of Hagari 1 and Selection 2390
- (4) *The Cotton Assistant, Perundurai*—1 sample each of Buorbon and Nadam
- (5) *The Agricultural Demonstrator, Dindigul*—1 sample of dry Cambodia (Kommaripatti)
- (6) *The Agricultural Demonstrator, Tadpatra*—1 sample of Hagari 1
- (7) *The Agricultural Demonstrator, Adoni*—1 sample of Hagari 1
- (8) *The Agricultural Demonstrator, Guntakal*—1 sample of Hagari 1

CENTRAL PROVINCES —

- (1) *The Economic Botanist for Cotton, O P, Nagpur*—5 samples of different strains and 4 samples of Banu and Verum strains
- (2) *The Superintendent, Government Experimental Farm, Akola*—1 sample of Strain 773

MISCELLANEOUS —

- (1) *The Director, Institute of Plant Industry, Indore*—13 samples of Malvi selections, 3 samples of Kharva and Musakheri cottons, and 7 samples of Dhar Malvi sub strains
- (2) *The Cotton Research Botanist, Parbhani*—7 samples of Gaorani strains, 5 samples of Parbhani strains, 1 sample each of Parbhani American and Havri 3 and one sample each of Gaorani, Gaorani 4 and Gaorani 6 from each of Parbhani, Madhol, Umri, Nanded, Loha and Latur
- (3) *The Crop Botanist, Malwa Division, Ujjain*—4 samples of Malvi cottons, 3 samples of Verums and one sample each of Banilla, Banu 306, B XXI, K 22, G 15, G 16, G 51, Cambodia, C 520, Roseum and Local
- (4) *The Senior Assistant Botanist, Hirsar*—2 samples each of M.A I, M.A II, and Local Doddahatti and one sample each of Herbaceum 190, Selection 69, Local Sannahatti and Co 2

- (5) *The Second Economic Botanist to Government, Bengal, Dacca*—1 sample of 289F cotton
- (6) *The Inspector of Agriculture, Kolhapur*—1 sample each of Jaya want and Kumpta
- (7) *The Superintendent, Main Farm, Raichur*—1 sample each of Hagari, Jayawant, Mungari and Local Kumpta
- (8) *The Assistant Botanist, Bukalasa Experimental Station, Bombo, Uganda*—1 sample each of S G 29, N 17, S P 20, and two samples each of B 37 and Local

The following tables give the distribution of samples, lots and counts spun and tested at the Laboratory in each season since 1924 —

TABLE I—*Distribution of samples spun, 1924-36*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36
Bombay	18	26	22	22	28	68	89	69	143	111	97	59	750
Sind												28	28
Punjab	14	1			42	30	10	44	55	42	23	71	332
United Provinces	7		6	11	9	7	16	7	12	6	7	11	99
Madras	2	19	50	23	50	51	66	15	28	101	30	51	466
Central Provinces	2			2	2	5	3	3	5	9	9	10	53
Miscellaneous	3	11		6	6	27	28	33	75	97	85	100	471
TOTAL	46	57	81	64	117	186	212	171	318	368	251	330	2,199
Standard Cotton Tests	8	54	49	64	33	34	27	18	18	16	18	23	362
Trade tests and Special Tests						37	89	134	125	166	131	145	825
GRAND TOTAL	54	111	130	128	150	257	328	323	461	549	400	496	3,386

TABLE II—*Distribution of lots spun, 1924-36*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36
Bombay	36	52	44	44	53	107	90	69	143	111	97	61	907
Sind												25	25
Punjab	26	4			83	41	10	44	55	42	23	71	399
United Provinces	14		12	22	18	14	16	7	12	6	7	11	139
Madras	4	38	100	46	60	85	66	16	23	101	30	51	625
Central Provinces	3		6	4	4	10	4	3	5	9	9	10	67
Miscellaneous	3	22		12	9	33	29	33	75	97	85	100	498
TOTAL	86	116	162	128	227	290	215	172	318	368	251	332	2,663
Standard Cotton Tests	34	176	142	178	63	64	54	36	36	37	46	58	902
Trade Tests and Special Tests						37	119	166	129	175	175	175	996
GRAND TOTAL	120	292	304	306	295	391	388	394	483	573	466	553	4,561

TABLE III—*Distribution of Yarns spun, 1924-26*

Province	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36	Totals 1924-36
Bombay	103	132	132	132	159	322	253	203	430	332	292	190	2 790
Sind												84	84
Punjab	106	14			254	113	31	136	163	127	72	220	1 238
United Provinces	27		36	66	54	42	40	22	32	18	21	35	393
Madras	12	108	278	138	180	255	199	53	85	303	90	151	1 852
Central Provinces	8		18	12	12	30	12	9	15	27	29	30	202
Miscellaneous	3	58		36	27	99	100	63	227	293	250	295	1 481
TOTAL	259	332	484	384	696	881	635	516	954	1 100	754	1 005	7 950
Standard Cotton Tests	95	514	423	447	290	223	309	136	200	180	204	162	3 183
Trade Tests and Special Tests						80	243	502	256	499	810	609	3 099
GRAND TOTAL	354	848	887	831	978	1 184	1 237	1 154	1 410	1 778	1 768	1 776	14 232

It will be seen from these tables that as compared with last year the number of samples spun during the period under review shows an increase of 24 per cent while the lots spun increased by 20 per cent. The number of yarns spun also shows a small increase. Among the samples received from the agricultural departments those sent from the Bombay Presidency, show a substantial decrease, but this is due to the separation of Sind Province as will be seen from the fact that the total for Bombay and Sind, remains practically the same as in the last year. Both the Punjab and Madras, show a very substantial increase in the number of samples sent to the Laboratory for tests, while the United Provinces and Central Provinces sent very nearly the same number of samples as last year. It will be noticed that, in spite of the increase from these provinces, the technological work of the Laboratory was not only maintained at its previous level but even speeded up, as is shown by the fact that special tests were made on 143 samples this year as against 131 samples last year. The number of standard cottons also shows an increase over last year which is due to the necessity, for certain technical reasons, of repeating tests on five of these cottons. It may be mentioned here that the two new cottons from Sind have been given the easy and attractive names of Sind Sudhar and Sind N R and it is hoped that these names will prove popular among the trade.

The statement and the tables given above do not include either the small size samples which were received for fibre tests alone or samples of yarns on which tests were made at the Laboratory. A summary of the former will be found on page 69 in this report, while the latter which numbered 73 were tested for mulls on payment of fees laid down by the Indian Central Cotton Committee. The small size samples relate to the strains which are as yet in the early stages of experimentation and of which sufficiently large size samples are not available for carrying out spinning tests. When the process of selection, with a view to narrowing down the number of these strains, has proceeded sufficiently far in the light of the results obtained at the Laboratory, the selected strains will be grown

in quantities sufficient for spinning tests which in due course will be made at the Laboratory. In the meantime the Cotton Breeder is guided in his selection work by the results of fibre tests which are made on his strains.

The results of the tests carried out at the Laboratory are embodied in spinning test, fibre test and yarn test reports. These reports are sent to the suppliers of the samples and, in the case of the agricultural samples received for tests at the Laboratory copies of the reports are also forwarded to the supervising officers of the cotton breeders. The cottons supplied by the East India Cotton Association, and the Bombay and Ahmedabad Millowners' Associations, which represent either the fair average samples of the season's crop or its early arrival in the market, are treated in a somewhat different way. The reports of the tests on these samples are published in the form of technological circulars which are distributed freely among the trade and the industry and copies of these circulars are also sent abroad to the principal importing countries of Indian cotton. The following table gives a statement of the number of reports falling under each class which were issued during the period under review together with the corresponding figures for the previous years.

TABLE IV—*Test Reports issued, 1924-36*

	1924 25	1925 26	1926 27	1927 28	1928 29	1929 30	1930 31	1931 32	1932 33	1933 34	1934 35	1935 36	Totals 1924- 36
Spinning Test Reports	7	19	19	22	21	63	92	60	87	121	112	135	758
Fibre Test Reports	1	1	5	1	7	4	7	19	30	18	19	44	158
Yarn Test Reports				1	4	4	2	3	5	3	7	13	42
TOTAL REPORTS	8	20	24	24	32	71	101	82	122	142	138	192	958

It will be seen that there is a very substantial increase under all heads in the number of reports issued from the Laboratory during the year under review. The number of fibre test reports was nearly $2\frac{1}{2}$ times of that issued last year, the number of yarn test reports issued was nearly double of that issued last year, while the number of spinning test reports showed an increase of 20 per cent. When it is realised that last year as many as 112 spinning test reports were issued, an increase of 20 per cent in this figure raises it to the record figure of 135. As a result of this all round increase the total number of reports issued during the period under review rose to 192 from 138 for the last year, which represents an increase of 40 per cent.

In spite of this substantial increase in the number of samples tested in and reports issued from the Laboratory, the staff of the Laboratory remained practically the same as during the last year. Only two Research Students were added as previous experience had shown that it was wise to have at least one Research Student, in hand to meet the demands from outside on the resources of the Laboratory without seriously dislocating its work. The main burden of the increase in the work of the Laboratory fell on the

old staff who showed commendable zeal in coping with the work especially as during the year the hours of work were increased. The strength of the permanent staff of the Laboratory from year to year since 1924 is given below in the following table —

TABLE V

As at August 31 in	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936
Technical Staff	8	11	20	24	27	27	32	32	32	33	34	34	34
Research Students	1	3	6	4	3	2	1	1	1	2	2	2	2
Purification Chemists			2	4	2	2	2	2	2	2	2	2	2
TOTAL	9	14	28	32	32	31	35	35	34	35	38	38	38

It may be added that it was found necessary, when the rush of samples became great, to employ four temporary junior testers for a period of three months each to enable me to meet the growing demand upon the resources of the Laboratory

CLASSIFICATION OF SAMPLES

The samples received for tests at the Technological Laboratory fall under the following four classes —

- (a) Agricultural samples
- (b) Standard Indian cottons
- (c) Trade samples
- (d) Technological samples

We shall now briefly describe the work done under each head —

(a) *Agricultural Samples* — These samples are mainly supplied by agricultural officers engaged on cotton breeding work in the different provinces of India. They either represent new or improved varieties which are under trial or such samples as are being grown in connection with the various botanical and physiological investigations undertaken by the Agricultural Department. Tests on new varieties are usually made on small samples and are restricted to fibre tests for the first few years. Guided by the results of these tests, only the most promising strains are retained for further experimentation. These are grown in sufficiently large quantities to enable the cotton breeder to send 10 lb samples to the Laboratory for spinning tests. The spinning tests are usually made for a number of years in order to make due allowance for seasonal variation and finally the most promising variety from the point of view of better yield, fibre properties, ginning percentage and higher spinning performance is selected for the purpose of multiplication and general cultivation. Among the other category fall those samples which are raised in connection with such investigations as the effect of different manurial treatments, the effect of

different dates of sowing, etc., etc. They are also usually repeated for a number of years to take into account the seasonal variation and at the end of each investigation a final report comprising the results for all the years is also issued to the officer who supplied the samples. Among the agricultural samples subjected to fibre and spinning tests this year at the Laboratory, mention may be made of the following

(1) *Uganda Cottons*—As stated in my previous reports, the Indian Central Cotton Committee has agreed to test, free of charge, eight samples of cottons supplied by the Agricultural Department, Uganda. The report containing the results of these tests on the last year's samples was considered by the Technological Research Sub Committee who recommended that the Department should be asked to include a sample of N 17 cotton which forms the control for Busoga. This recommendation of the Technical Committee was conveyed to the Department concerning N 17 cotton along with the other samples.

(2) *Effect of differential irrigation upon the fibre properties and spinning quality of cotton*—This investigation has been in progress for some time past. The available results were considered by the Technological Research Sub Committee who recommended that in view of their useful and interesting nature, they should be sent up for publication in a suitable journal. In view of the fact that the effect of differential irrigation on the stand in the field, the shedding of flowers and bolls, the yield per acre, etc., is equally important, it was thought highly desirable that the account of this investigation should be complete with the collaboration of the cotton breeders. Accordingly the cotton breeders concerned were requested to send in their contribution and the bulletin detailing the results of this investigation have been in amounts of Coimbatore.

(3) *Tests on long staple Sind cottons*—In view of the increasing importance of the long staple cottons which can be grown in the new area brought under cultivation in Sind, preliminary tests on two promising varieties, namely Sind Sea Island and Boss III cottons, were made last year and the results were placed before the Technological Research Sub Committee for their decision as to any further action that may be regarded desirable. The Technological Research Sub Committee suggested that in the ensuing year tests should be made not only on samples supplied by the Agricultural Department, but also those used by the mills in order to assess the variation in quality that may occur between the grower and the consumer. In accordance with the recommendation of the Technological Research Sub Committee tests were made during the period under review on five samples of long staple Sind cottons of which two were supplied by the Agricultural Department, Sind, and three by mills and firms using

these cottons. In addition, tests were also made for the purpose of comparison, on three samples of Giza 7 and one sample of Maarad cotton. The detailed report containing the results of these tests was placed before the Technological Research Sub-Committee who recommended that these tests should be repeated for one more season in order to make due allowance for seasonal variations. Samples of these cottons, as in the past, are sent to the Agricultural Departments and from the course.

(4) *Hyderabad Gaorani 4 and Gaorani 6 cottons*—It has been stated above that in the initial stages of experimentation tests in this Laboratory are generally made on small size samples which are tested for their fibre properties. Subsequently when the field of selection is narrowed down sufficiently, spinning tests are made on moderately large size samples. A good illustration of this useful principle will be found in the case of these two cottons which were tested for the first time in 1930-31, when 35 samples were received for fibre tests. In the following season fibre tests were made only on 14 samples, which gave the best results in the previous year, while in 1932-33 the selection was narrowed down to 6 samples which were valuable to the Laboratory to undertake

In the following two seasons the number of tests were reduced to three, out of which Gaorani 4 and Gaorani 6 were distributed for district trials at six different centres. In the year under review spinning tests were made on 12 samples of the two cottons grown at different places and a comprehensive report detailing the results of these tests showing differential response of each variety to locality of growth, etc., was sent to the Agricultural Department.

(5) *Hiriyur cottons grown on dry and wet lands*—Two samples of each of three Mysore cottons were received for tests under different conditions with rain fed conditions.

Spinning tests were made on these six samples, and it was found that in all cases the sample grown under rain fed conditions gave a much better performance than the parallel sample grown under irrigated conditions. The results of these tests, which are likely to be valuable to the cultivator, were communicated to the Department in a report with the recommendation that these tests may be repeated in the following season.

(6) *289F Cotton grown in Dacca*—Although Dacca was at one time famous for its cotton, the result of the spinning tests made with the 289F cotton grown in the District of Dacca showed that it compared very favourably with the 289F cotton grown in the District of Dacca and the progress of this cotton in Dacca is of great interest.

(7) *Desi crosses from Lyallpur*—During the period under review four *desi* crosses from Lyallpur, D C 1, D C 6 D C 7 and D C 13, were tested for fibre properties and spinning performance and were found to be much superior to Mollison. The best results among them were given by D C 13. In order to find out its performance under mill conditions, arrangements were made with a local mill for testing a bale of this cotton which was supplied by the Cotton Research Botanist, Lyallpur. The mill expressed their complete satisfaction with the performance of this cotton which has since been named Jubilee cotton, and supplied a sample of cloth made from it, which was sent to the Cotton Research Botanist, Lyallpur.

(8) *Podupatti cotton from Malabar*—This is the first time that a cotton has been received for tests from Malabar. It was found suitable for spinning upto 11s standard warp counts and its behaviour in the ensuing seasons will be watched with interest.

(b) *Standard Cottons*—These cottons mostly represent the improved varieties which now cover some 15 per cent of the total area under cultivation of cotton in India. During the period under review no change was made in the list of standard Indian cottons. As usual 4 page circulars were issued on the following ten cottons which were received sufficiently early in the season —

- 1 Punjab American 289F
- 2 Verum 262 (Nagpur)
- 3 Verum 262 (Akola)
- 4 V 434 (Akola)
- 5 Late Verum (Nagpur)
- 6 Umri Bani
- 7 Punjab American 4F
- 8 Cambodia Co 2
- 9 Sind Sudhar
- 10 Surat 1027 A L F

The bulletin containing the results of tests on all the standard Indian cottons for 1935-36 together with the results for the previous seasons was issued in July 1936.

(c) *Trade samples*—(1) In order to bring the work of the Laboratory into closer touch with the industry and the trade, it has been the practice for some time past to undertake spinning tests on samples of trade varieties of Indian cottons. These samples fall under two heads. Under the first head are included those samples which are supplied by the East India Cotton Association. These represent the fair average quality of different varieties of Indian cottons which form the bulk of the cotton crop and are selected by the members of the East India Cotton Association, who report. Under the second head fall the samples supplied by the mill members of the Bombay

and Ahmedabad Millowners' Associations and which represent the early arrivals of the various Indian cottons into the local markets. These samples are supplied by the mills who also kindly supply valuation reports on their samples. Both types of samples are subjected to a thorough spinning test and the results of these tests are published in 2 or 3 page circulars which are distributed to the trade and industry. Copies of these circulars, containing full information regarding the waste losses, spinning behaviour and yarn characteristics of these cottons, are also sent abroad to countries which import Indian cottons in appreciable quantities. The following statement gives a description of the trade samples which were tested during the period under review —

Cottons supplied by the East India Cotton Association

1	Coompta (1934 35)	10	Dholleras
2	C P No 1	11	Broach
3	Berar	12	Jagadia
4	Khandesh	13	Surat
5	Muttia	14	Navsari
6	Latur	15	Kalagin
7	Nanded	16	Farm Westerns
8	Punjab American	17	Bijapur
9	Kadi Viramgam	18	Upland

Cottons received in accordance with the arrangement made with the Millowners' Associations of Bombay and Ahmedabad

BOMBAY

1	Bengals	11	Surat
2	Khandesh	12	Navsari
3	Ujjain	13	Truppur Cambodia
4	Mandsaur (Ujjain)	14	Moglai
5	Broach	15	African Busoga
6	Hubli Kumpta	16	African Kampala
7	Hubli Upland	17	African Jinja
8	Bailhongal	18	Farm Westerns
9	Karunganni	19	Miraj
10	Kurnool Cambodia	20	Westerns

AHMEDABAD

1	Jagadia	2	Kadi
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A list of the technological circulars issued on these samples will be found under the head "Publications". Last year it was thought desirable to compile the circulars in the form of a bulletin which should constitute a handy reference book for the users of Indian cottons and should be entitled "Technological Reports on Trade Varieties of Indian Cottons". During the period under review this bulletin was published for the first time and was much appreciated by the public interested in the Indian cottons.

(2) In addition to these tests, the Laboratory continued, as in the past, to receive samples from private mills which were tested on payment of certain fees laid down by the Indian Central Cotton Committee. The scale of fees is given below —

(1) Fibre or Yarn Test —	Rs	a
(a) Mean fibre length	7	8
(b) Fibre weight per inch	7	8
(c) Fibre strength	10	0
(d) Lea test	7	8
(e) Ballistic test	7	8
(f) Single thread test	7	8
(g) Twist	7	8
(2) Fibre and Blow room Test —		
(a) Fibre tests as for (a)—(c) above		
(b) Blow room only	10	0
(c) Shirley Analyser tests	7	8
(3) Full Test —		
(a) Fibre tests as for (a)—(c) above	35	0
(4) .	50	0
(5) Identification of fibre (microscopic test)	25	0
(6) Percentage of size	15	0
(7) " grease	7	8
(8) " free acid	7	8
(9) Presence of mildew	15	0
(10) Causes of mildew growth	7	8
(11) Percentage of immature fibres —	30	0
(a) In lint or <i>kapas</i>		
(b) In yarn or cloth	10	0
	15	0
(12) Wax content —		
(a) 1 Sample	12	8
(b) 2 Samples	22	8
(c) 3 Samples	30	0
(d) Each additional sample	7	8
(13) Determination of mechanical injury to fibre	10	0
(14) Tests in addition to the ordinary 3 roller system (per system)	10	0

(15) Cloth Samples —

Rs a.

(a)	Actual counts	..	..	.	..	15	0
(b)	Actual twist	..	..	..	.	20	0
(c)	Single thread strength	..	..	.	.	20	0

(16) Moisture Tests .—

(a)	1 Sample	..	..	.	..	5	0
(b)	2 Samples	.	..	..	..	7	8
(c)	3 Samples	..	..	.	..	10	0
(d)	4 Samples	..	.	.	.	12	8

During the period under review the number of such samples showed a very considerable increase which is a remarkable proof of the growing appreciation of the work of the Laboratory and the utilisation of its resources by the industry. During this period the Laboratory carried out on behalf of various mills and firms spinning tests on 7 samples, fibre tests on 32 samples, yarn tests on 73 samples, moisture tests on 10 samples, shirley analyser tests on 4 samples and blowroom tests on 1 sample, the total number of samples tested for the industry being 127. When it is remembered that last year the number of such samples was 39, the fourfold increase in one year is a striking illustration of the manner in which the industry is consulting the Laboratory more and more every year in the solution for its problems.

(3) *Effect of different degrees of compression on the spinning quality of cotton*—Following the recommendation of the Technical Committee Sub Committee these 4 cottons namely, Punjab and Cambodia Co 2 was placed before the meeting and it was decided that it should be published in the form of a bulletin. This will be done.

(4) *Effect of artificial watering on the spinning quality of cotton*—This investigation has now been brought to a close. The two cottons selected for this purpose were Amraoti and Broach (Palej). The experimental results are now being analysed and a report will be issued in due course.

(5) *Effect of artificial watering on the spinning quality of cotton*. The result of the research was published in the form of a bulletin. This was done and a summary of the bulletin will be found under the head 'Publications'.

(d) *Technological samples*—These samples are tested and spun at the Laboratory in connection with the various technological investigations which are undertaken here. A brief account will now be given of the more important investigations and the progress made in respect of each.

(1) *Tests with different systems of high draft spinning*—The Laboratory had already published in the past two bulletins on the application of different systems of high draft spinning to Indian cottons. This work has now been extended by using more systems of high draft spinning. Mixings of cottons prepared from Superfine Oomra, Punjab American 4F and Cambodia Co 2 as well as the pure cottons themselves have been spun on 9 different systems. The results of these tests are now available and are being written up in the form of a technological bulletin which will be published shortly.

(2) *The effect of storage on seed cotton prior to ginning*—Last year a bulletin on this subject was published in the Journal of Textile Institute. The Technological Research Sub Committee, while considering a summary of the results, recommended that these experiments should be extended to a Kathiawar cotton such as Wagad 8 and that the period of storage should also be extended to four months. Accordingly, in the period under review tests embodying these two recommendations of the Technological Research Sub Committee were carried out and a report on the results obtained will be published in due course.

(3) *Lamit spinning tests*—In order to study the effect of inserting different degrees of twists on the strength, evenness, appearance, etc., of yarn spun from Indian cottons an investigation was undertaken on these lines. For this purpose yarns were spun from Superfine Oomra and Punjab American 4F with different twist multipliers ranging from $3\frac{1}{2}$ to $5\frac{1}{2}$. Furthermore, the African cottons A R Kampala, A R Busoga and A R Jinja, received for tests at the Laboratory were also spun with different twist constants. Similarly, the long staple cottons Giza 7 and Sea Island which were used in connection with another investigation were also spun with various twist constants. This investigation is in progress. It is proposed to extend these tests to other cottons in order to make the results and conclusions as comprehensive as possible.

(4) *Effect of different roller settings and twists on the spinning quality of cotton*—The object of these tests was to find out the best scheme of roller setting and twists in the fly frames and roller settings in the ring frame which would give the optimum results for strength, evenness, appearance, etc., of yarns. For this purpose Surat 1027 A.L.F., Punjab American 4F and Cawnpore K 22 cottons were selected and processed with different twists and roller settings in the fly frames and spun with different roller settings in the ring frame. The results of this investigation were published during the period under review in a bulletin a summary of which will be found under the head 'Publications'. In continuation of this work it is now proposed to take one cotton, namely Punjab American 289F, and to spin it from medium, light and heavy card sliver with different schemes of drafts and speeds in the fly frames in order to ascertain the best distribution of drafts and speeds which should give the optimum results for a cotton of this type. This work is in progress.

(5) *Quality of lint in relation to ginning factors*—It is being realised that considerable damage is done to Indian cottons, especially the long staple ones, by defective or improper ginning and that a systematic study of the best ginning conditions for different types of cotton is highly desirable. In view of this, seed cotton of nine standard cottons was ginned in a single roller gin with different settings of the moving knife and in a saw gin with different speeds. The lint, obtained under each specific ginning condition, was spun into suitable counts and the yarns were tested for strength, evenness, neppiness, etc. The results of this investigation were published during the year under review in the form of a bulletin, a summary of which will be found under the head 'Publications'. As a continuation of this investigation, *lapas* of two cottons, namely, Cambodia Co 2 and Karunganni C 7, has been obtained. Moreover, in view of the increasing importance of the long staple cottons it is also proposed to obtain *lapas* of Sind Sea Island. Further tests with these seed cottons, employing a wider range of moving knife setting on a full size double roller gin will be made. It is also intended to study the effect of density of feed on the quality of lint. These tests will be made as soon as opportunity permits.

(6) *Tests on mixtures of Indian cottons and staple fibre*—During the last few years cotton mills in general have been using the newly developed staple fibre in their preparations. In order to find out the suitability of mixing different types of staple fibre with different varieties of Indian cottons tests were undertaken during the period under review on three types of staple fibre which were mixed in different proportions with Cambodia and Jayawant. The pure cottons, the staple fibres and the mixtures were spun into suitable counts and tested for their yarn characteristics. A report containing the results of these tests will be issued very shortly.

(7) Effect of raising the middle roller on the spinning performance of a cotton—It was decided by the Indian Central Cotton Committee that if the results of any tests carried out on behalf of a particular mill are found to be of general interest and if the mill agrees to the publication of such results for general information, the ordinary fees chargeable for the work done by the Laboratory should be waived and the results should be published. During the period under review 16 samples of yarn spun from Sindhi cotton were received from a local mill. These yarns were spun with two different middle roller elevations and with light and heavy middle and back rollers. As it was felt that the results of the tests carried on these yarns might interest the mill industry in general, the committee recommended that they be published for the publication of these results.

To it and a bulletin containing the results of the period under review. A summary of the head "Publications."

(8) *Tests on mixings of Indian cottons*—This investigation forms a part of the programme approved by the Indian Central Cotton Committee. The object of these tests is to find out the relative importance of the various

fibre properties in determining the 'mixing quality' of two cottons. For this purpose tests have hitherto been made on Surat 1027 A L F, Superfine Oomra, Punjab American 289F, Cambodia Co 2, Broach (Pale), Punjab American 4F, Jayawant, Khamgaon, Kampala, Punjab Desi, Raman and Wagad 8. Besides fibre tests, the cottons are mixed according to a plan and the mixtures are spun into suitable counts. This investigation is in progress.

(9) *Effect of humidity on card losses*—The spinning room of the Laboratory is maintained during the dry season at a relative humidity of 60%—65%. During the monsoon, however, the humidity sometimes rises to about 80%, and there is no means available of bringing it down. As it may happen that a sample may be tested under a high humidity in one year and under ordinary medium humidity in the next year, it was regarded desirable to make some tests under these two conditions of humidities in order to find a basis of comparison for the spinning behaviour in general and the card losses in particular. The tests which were carried out for our own guidance gave some interesting results which it is proposed to publish in the form of a leaflet for general information.

II RESEARCH LABORATORY

Fibre Testing Section—It has been stated above that in addition to the samples on which a spinning test is made, small size samples for fibre tests alone are also received at the Laboratory. These samples are tested in the Fibre Testing Section. One noteworthy feature of the year under review is the fact that the East India Cotton Association sent as many as 52 samples for determination of mean fibre length. This represents a very large increase in the number of samples tested by the Laboratory for the Association in any one year, and though in this particular year it may have been due to exceptional circumstances, it does emphasise yet another direction in which the work of the Laboratory has found an immediate and useful application and recognition. The following statement gives the distribution of the small size samples on which fibre tests were carried out at the Laboratory during the period under review—

- 1 *The East India Cotton Association, Ltd, Bombay*—52 samples
- 2 *The Cotton Research Botanist, Parbhani*—17 samples of Gaorani strains, 4 samples each of Parbhani strains and Raichur Kumpta and one sample of Kumpta Local
- 3 *Senior Assistant Botanist, Hiryur*—4 samples each of Nadam and Cernuum crosses, Arboreum and Herbaceum crosses and Natural cross selections and one sample of C×N 86
- 4 *The Farm Manager, Nandyal*—8 samples of selections

5. *The Cotton Specialist, Coimbatore*—12 samples of irrigation experiments.
6. *The Cotton Breeder, S Gujerat, Surat*—One sample of Segregate.
7. *The Director, Institute of Plant Industry, Indore*—2 samples of hybrids
8. *The Director of Agriculture, Baroda State, Baroda*—2 samples of 1027 A L.F cotton
9. *The Cotton Breeder, Broach*—6 samples of F3 back crosses, 4 samples of B D 8 and Goghari crosses and 1 sample of New Selection 49.
10. *Senior Cotton Asst, Guntur*—5 samples of strains
11. *D R Vakharia Esq, Broach*—1 sample of Dakor Farm cotton

It will be seen from the above statement that during the period under review fibre tests were made on 133 samples, the corresponding figure for last year being 59. Thus, in the current year the number of samples increased by nearly $2\frac{1}{2}$ times as compared with the last year

As might be expected, the Fibre Testing Section was kept fully occupied in making the tests on the samples mentioned above as well as on those on which spinning tests were made

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creas
decre
cottons and the peak values of strength are attained at lower twists for the shorter than for the longer cottons. It is also found that the left-handed twist has a greater effect on the strength of an equal amount of twist increases rapidly shorter than for the longer cottons but that the direction of twist does not make any difference to the percentage contraction. Detailed results of this investigation will, it is hoped, be soon published in the form of a Technological Bulletin

Physics Section—Mr R S Koshal continued his analysis on the effect of distribution of rainfall and temperature on the fibre properties and

spinning quality of cotton During the period under review an analysis of the following cottons was completed —

<i>Madras</i>	Nandyal Karunganni C 7 Hagari 1 C A 9
<i>United Provinces</i>	Verum 262 (Nagpur)
<i>Central Provinces</i>	Verum 262 (Akola)
<i>Bombay</i>	Surat 1027 A L F

The other cottons for which the data are available and are being analysed are Wagad 8, Jayawant and Gadag 1 In view of the great importance of this subject to cotton growers and the very interesting results which have already been obtained, it is proposed to place this subject on the agenda of the First Conference of Research Workers on Cotton which is expected to be held after the next cold weather meeting of the Committee

Mr C Nanjundayya was engaged for part of the period under review for writing up a description of the stapling apparatus which was designed at the Laboratory sometime ago A bulletin describing the construction and use of this apparatus and containing a summary of the results obtained with it, has been sent for publication in the Journal of the Textile Institute, Manchester During the remainder of the period, Mr Nanjundayya continued his investigation on the relationship between the fibre properties and the breaking strength and extension of yarn This investigation forms a part of the programme of work approved by the Committee and is in progress

Dr K R Sen continued with his investigation on the relative importance of the various fibre properties in determining the mixing quality of Indian cottons This investigation also forms a part of the programme of work approved by the Committee and is in progress

Microscopy Section — *Mr A N Gulati* has continued with his investigation on the effect of heredity, environment, irrigation, rainfall, etc on the maturity of cotton fibre It was found that very suitable material for this investigation was available from the various farms affiliated to the Institute of Plant Industry, Indore The Director of the Institute very kindly agreed to supply small samples for the purpose of this investigation The investigation, however, had to be temporarily suspended owing to the illness of Mr Gulati which necessitated his absence from the Laboratory for 2½ months

It will be remembered that an investigation was completed at the Laboratory sometime ago on the relationship between the maturity of cotton fibre and the neppiness of yarn spun from it. In this investigation the method employed for the determination of maturity in cotton fibre, though accurate, was found to be rather slow and tedious. During the period under review an attempt was made to improve this method so that a larger number of tests could be carried out in a much shorter time. This attempt proved successful and a new type of slide, which could be easily fitted on the stage of standard microscope, was designed at the Laboratory. The use of this slide made the work of mounting and counting fibres much less irksome than in the past, and the maturity percentage determination could be made much more quickly without any loss in accuracy of results. A short note describing this new device was sent up for publication to the Journal of the Textile Institute and appeared in the April 1936 issue of the Journal. Several of these slides, manufactured at the Laboratory, have been supplied to the Technological Assistants working in the mofussil laboratories.

Mr Gulati also made observations on a new type of progressive damage to cotton fibre by micro organisms. An account of it was published in the Indian Journal of Agricultural Science and a summary of it will be found under the head 'Publications'.

Chemistry Section—Mr D L Sen remained on study leave during the period under review. He is at present working under Prof Scholefield at the College of Technology, Manchester, and is due to return on the 20th September 1936.

Dr Lajp, Thoria continued his work on the determination of the cellulose content of different varieties of Indian cottons. The results obtained by him upto November 1935 were considered by the Technological Research Sub Committee and it was decided that these tests should be made on such short staple cottons as are capable of giving, by virtue of possessing a high yield and high ginning percentage, a large outturn of cellulose per acre. The Directors of Agriculture of the various Provinces and Indian States were requested to ask their cotton breeders to send samples of such high yielding short staple varieties. In response to this request 40 samples were received out of which tests were made on nearly 30 samples. In addition to the testing of these samples, Dr Thoria has also made tests with a view to finding out if certain modifications in the treatment given to cotton would result either in a substantial improvement in the quality of the films made from it or an appreciable reduction in the cost of the treatment. During the period under review Dr Thoria brought the first investigation to a close and also did a certain amount of preliminary work with regard to the second investigation. An account of these two investigations will be published in due course.

Mr G Rama Rao was appointed Research Scholar on the 20th January 1936 and after the customary training in the determination of physical and

chemical properties of cotton fibre was put on an investigation on the absorption of dyes by Indian cottons at the point where it was left by Mr D L Sen. Mr Sen in his work had used a method of adding the dye solution to the cotton until the saturation point was reached. Since this method was not only slow but was also subject to personal errors of judgment, a new colorimeter, which employs the photo electric cell, has been designed at the Laboratory in which the amount of dye left over in the solution is accurately measured. During the greater part of the period covered by this report, Mr Rama Rao was engaged in erecting and calibrating this new apparatus. The remainder of the period was utilised by him to the examination of the absorption of certain well known dyes by some of the standard cottons.

Mr Rama Rao also assisted me in completing an apparatus for recording the direction of wind. A request for an apparatus of this type was made by the Cotton Research Botanist, Lyallpur, sometime ago, who stated that he required it in his work on the study of the effect of wind on cotton crop. This apparatus was designed and completed during the period under review and supplied to the Cotton Research Botanist, Lyallpur.

Mr M U Parmar who was the second Research Scholar selected in the course of this year joined the Laboratory on the 16th January 1936. He was also given the customary training in the methods of fibre and yarn tests. After he received this training, he was entrusted with the investigation on the effect of kier boil treatment on the yarn properties and fibre structure of cotton. The cottons selected for this purpose are Punjab American 289F, Surat 1027 A L F, and Jayawant. Samples of yarn spun from each of these cottons were given different kier boil treatment in the Department of Chemical Technology, University of Bombay. These samples are being tested for strength, extension and chemical damage at the Laboratory, while according to the present arrangement the lustre test will be made by the Department of Chemical Technology.

Mr Parmar also made a number of tests in connection with the investigation on the effect of raising the middle roller setting to which a reference has been made under the head "Technological Samples".

III MOISTURE TESTING SECTION

In the absence of Mr D L Sen, on study leave, Mr P S Sambamurthy, carried out the work of this Section. During the period under review, 24 samples were tested for moisture as follows —

Appeal Committee	2
Trade	11
Laboratory	11

The total number of samples tested at this Section upto 31st August 1936 is 771

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Mr Rama Rao also assisted me in completing an apparatus for recording the diurnal variation of the humidity of the air. This type was made by the late Mr. J. B. S. S. who stated that he required a large quantity of cotton dyes. This apparatus was designed and completed during the period under review and supplied to the Cotton Research Botanist, Lyallpur.

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IV PUBLICATIONS

The Brochure entitled "Cotton Research in India" was published in accordance with the recommendation of the Technological Research Sub Committee during the period under review. I am glad to be in a position to say that this Brochure was very well received by the Presses, the research organisations and the trade and industry connected with cotton. I give below a few of the extracts from the reviews and letters relating to this Brochure.

Textile Manufacturer—"The Indian Central Cotton Committee though it has—together with the Indian Agricultural Department—great things to its credit, has too many huge problems in front of it to feel much satisfaction, but it can look to its Technological Laboratory at Matunga with pride. It was a pioneer Institute for in the actual establishment of a Cotton Spinning Laboratory it was in advance of the Shirley Institute or the Egyptian Government. Collected together, it marks an impressive work of reference. The spinning tests in its next section look both ways, they are tests of cotton on behalf of the breeders and the growers and technological research which serves the users and thus encourage the proper use of and appreciation of the improved Indian cottons. There is incidental research work which is of great interest and value directly to the cotton spinner."

International Cotton Bulletin—"Dr Nazir Ahmad and the Indian Central Cotton Committee are to be congratulated upon the production of a work of exceptional interest."

A Mill—"On going through, we find the book very useful and we appreciate the work of the Laboratory."

Consul General for Belgium—"I have sent the same to the Belgian Ministry for Colonies, who, I feel assured, will find this documentation interesting and helpful for their research work in Africa."

Royal Afghan Consulate—"I congratulate you on this valuable publication and the success that your Laboratory has attained and the services that it is rendering under your leadership to the most important industry in India."

Prof F Scholefield—"Thank you very much for the copy you have sent me of your very interesting report on cotton research in India."

"I have not yet had the opportunity of looking through it, but a mere glance is sufficient to show the great interest of the work, and I ask you to accept my best thanks for your kindness in sending a copy to me."

W T Astbury, Esq — "This is to acknowledge with very many thanks the arrival of the copy of your pamphlet on cotton research in India which you so kindly sent me. You may be sure that I am very pleased indeed to have this"

Commissioner, Ministry of Industries, National Government of the Republic of China — "I found that this Brochure is of much interest to this Bureau, and have put it in our library for the public to read"

Russell T Fisher, Esq, The National Association of Cotton Manufacturers, U S A — "I know it will be a valuable addition to the Association Library"

H A Hancock, Esq, Cotton Research Board, Giza, Cairo — "I received your booklet 'Cotton Research in India,' which I have read with very great pleasure, it has not been acknowledged before because I was under the impression that I was reading the Library copy! The volume and the quality of work reflect the great credit on your Laboratory and your Committee's policy of free and open publication make the results of treble value"

In addition to this Brochure, the following publications were issued during the period under review —

I TECHNOLOGICAL BULLETINS, Series A Nos 28 to 34

1 Technological Bulletin, Series A, No 28

"Technological Reports on Standard Indian Cottons, 1935" by Nazir Ahmad, M Sc, Ph D, F Inst P

2 Technological Bulletin Series A, No 29

"Technological Reports on Trade Varieties of Indian Cottons, 1935" by Nazir Ahmad, M Sc, Ph D, F Inst P

3 Technological Bulletin Series A, No 30

"The Effects of Storing Cotton Bales in the open and inside a shed at Karachi" by Nazir Ahmad, M Sc, Ph D, F Inst P

4 Technological Bulletin Series A, No 31

"Quality of Lint in Relation to Ginning Factors" by Nazir Ahmad, M Sc, Ph D, F Inst P

5 Technological Bulletin Series A, No 32

"The Effect of Employing Different Roller Settings and Twists on the Spinning Performance of three Indian Cottons" by Nazir Ahmad, M.Sc, Ph.D, F Inst P and R P Richardson, F.T.I.

6 T Cottons, 1936 "

7 " Roller and some other
dhia Cotton " by Nazir

Ahmad M Sc , Ph D , F Inst P

II TECHNOLOGICAL BULLETIN, Series B No 21

1 " the Average
"r Ahmad,
M Sc

III MISCELLANEOUS PUBLICATIONS

- 1 "A Device for Mounting Cotton Hairs for Examination of Fibre Maturity " by N Ahmad, M Sc , Ph D , F Inst P and A N Gulati, M Sc
- 2 "A Note on a New Type of Progressive Damage to the Structure of Cotton Hair caused by Micro organisms " by A N Gulati, M Sc

IV TECHNOLOGICAL LEAFLETS

- 1 Technological Leaflet No 5, entitled
'The Influence of Method of Picking on the Quality of Cambodia Cotton '

V TECHNOLOGICAL CIRCULARS Nos 196 to 257, as under —

Circular No	Title	Date of publication
196	Spinning Test Report (No 624) on samples of Dholleras cotton 1934 35	September 1935
197	Spinning Test Report (No 626) on samples of Westerns cotton 1934 35	September 1935
198	Spinning Test Report (No 627) on samples of Surat Cotton 1934 35	September 1935
199	Spinning Test Report (No 628) on samples of Tinnevely Cotton 1934 35	September 1935
200	Spinning Test Report (No 630) on samples of Cambodia Cotton 1934 35	September 1935
201	Spinning Test Report (No 631) on samples of Karun ganni Cotton 1934 35	September 1935
202	Spinning Test Report (No 633) on samples of Bijapur Cotton, 1934 35	September 1935

Circular No	Title	Date of publication
203	Spinning Test Report (No 634) on samples of Bagalkote Cotton 1934 35	September 1935.
204	Spinning Test Report (No 635) on samples A R Jinja Cotton 1934 35	September 1935.
205	Spinning Test Report (No 637) on samples of A R Busoga Cotton 1934 35	September 1935.
206	Spinning Test Report (No 638) on samples of A R Kampala 1934 35	September 1935.
207	Spinning Test Report (No 640) on samples of Kumpta Cotton 1934 35	September 1935
208	Technological Report on Punjab American 289F, 1935 36	December 1935
209	Spinning Test Report (No 665) on samples of Ujjain Cotton 1935 36	January 1936
210	Spinning Test Report (No 666) on samples of Bengala Cotton 1935 36	January 1936
211	Spinning Test Report (No 667) on samples of Khandesh Cotton 1935 36	January 1936
212	Spinning Test Report (No 670) on samples of Moglai Cotton 1935 36	January 1936
213	Spinning Test Report (No 680) on samples of Ujjain (Mandaur) Cotton 1935 36	February 1936
214	" " " " " "	February 1936
215	" " " " " "	February 1936
216	" " " " " "	February 1936
217	" " " " " "	February 1936
218	" " " " " "	February 1936
219	" " " " " "	February 1936
220	" " " " " "	March 1936
221	" " " " " "	March 1936
222	Spinning Test Report (No 696) on samples of Latur Cotton 1935 36	March 1936
223	Spinning Test Report (No 697) on samples of Punjab American Cotton 1935 36	March 1936
224	Spinning Test Report (No 700) on samples of Mutia Cotton 1935 36	March 1936
225	Technological Report on Cambodia Co 2 (Cambodia 440) 1935 36	April 1936
226	Spinning Test Report (No 703) on samples of Navsari Cotton 1935 36	April 1936
227	Spinning Test Report (No 704) on samples of Surat Cotton 1935 36	April 1936
228	Spinning Test Report (No 705) on samples of Balhonga Cotton 1935 36	April 1936
229	Spinning Test Report (No 706) on samples of Tirupur	April 1936
230	" " " " " "	April 1936
231	" " " " " "	April 1936
232	" " " " " "	April 1936
233	" " " " " "	April 1936
234	Spinning Test Report (No 710) on samples of Hbbh Kumpta Cotton 1935 36	Mar 1936

Circular No	Title	Date of publication
235	Spinning Test Report (No 711) on samples of Hubli Upland Cotton 1935 36	May 1936
236	Spinning Test Report (No 712) on samples of Navsari Cotton 1935 36	May 1936
237	Spinning Test Report (No 713) on samples of Surat Cotton 1935 36	May 1936
238	Spinning Test Report (No 714) on samples of Jagad a Cotton 1935 36	May 1936
239	Spinning Test Report (No 715) on samples of Kadi Cotton 1935 36	May 1936
240	Technological Report on Surat 1027 A L F 1935 36	May 1936
241	Spinning Test Report (No 719) on samples of Dhollerias Cotton 1935 36	June 1936
242	Spinning Test Report (No 728) on samples of Broach Cotton 1935 36	July 1936
243	Spinning Test Report (No 729) on samples of Jagadia Cotton 1935 36	July 1936
244	Spinning Test Report (No 730) on samples of Berar Cotton 1935 36	July 1936
245	Spinning Test Report (No 733) on samples of African Busoga Cotton 1935 36	July 1936
246	Spinning Test Report (No 734) on samples of Jinja Cotton 1935 36	July 1936
247	Spinning Test Report (No 735) on samples of Khandesh Cotton 1935 36	July 1936
248	Spinning Test Report (No 736) on samples of Kampala Cotton 1935 36	July 1936
249	Spinning Test Report (No 739) on samples of Miraj Cotton 1935 36	July 1936
250	Spinning Test Report (No 740) on samples of Tiruppur Cambodia Cotton 1935 36	July 1936
251	Spinning Test Report (No 742) on samples of Karunganni Cotton 1935 36	July 1936
252	Spinning Test Report (No 743) on samples of Northern Cambodia Cotton 1935 36	July 1936
253	Spinning Test Report (No 754) on samples of Farm Westerns Cotton 1935 36	August 1936
254	Spinning Test Report (No 755) on samples of Upland Cotton 1935 36	August 1936
255	Spinning Test Report (No 756) on samples of Kadi Viramgam Cotton 1935 36	August 1936
256	Spinning Test Report (No 757) on samples of Bijapur Cotton 1935 36	August 1936
257	Spinning Test Report (No 758) on samples of Kalagin Cotton 1935 36	August 1936

Summaries of the Publications issued during the period under review are given below —

(1) *Technological Bulletin Series A, No 30 'The Effects of Storing Cotton Bales in the Open and Inside a Shed at Karachi'* — This report contains an account of the investigation carried out to find (1) the extent of the deterioration occurring in the bales kept in the thole yard in Karachi

taking for purposes of comparison similar bales stored for the same period of time in a shed and (u) whether the expenditure for erecting godowns in Karachi would be justified by the better results and prices obtained for the bales stored in these godowns. This investigation was extended to the three varieties (1) Punjab American (2) Punjab Deshi and (3) Sind Deshi which form the bulk of the trade cotton received at Karachi. Six bales of each variety were obtained out of which three were placed in the thole yard, and the other three inside a shed. At the commencement of the experiment, the top hoop of each bale was broken and a representative sample weighing 25 lbs. was drawn from several layers. This was tested in duplicate lots and formed the basis of comparison for the samples drawn on subsequent occasions. The bales were then repressed by hand and stored for six months after which representative samples were drawn from one bale of each variety in the shed and the thole yard. This process was repeated after 12 months and 18 months' storage, the samples being tested similarly on each occasion. Out of these, the initial tests and those obtained after 12 months' storage referred to early part of the year before the rainy season, while the other two sets referred to the latter part of the year soon after the rainy season. The following conclusions were drawn from the results of these tests —

1 *Fibre Properties* —The fibre results showed that storage of these cottons for periods extending upto 18 months had no appreciable effect either upon their mean fibre length or mean fibre weight per inch. There was, moreover, no indication of any differential response either in respect of the manner of storage (thole yard or godown) or in regard to the variety of cotton.

2 *Yarn Strength* —As against the fibre tests, the yarn results showed a significant change in the spinning quality of these cottons depending upon the manner of storage. Furthermore, the three types of cotton responded differently to the action of time and the condition of storage.

(i) It was found that if bales of these cottons are stored for some time, either in the thole yard or in the shed, stronger yarns are obtained, which is due to the atmospheric conditions of humidity and temperature. It should, however, be emphasised that this improvement takes place only in yarn strength and is off set to a certain extent by the gradual discoloration and loss of bloom of the stored cotton.

(ii) Keeping the bales in the open in the thole yard has a very definite harmful effect upon the spinning quality of these cottons, this effect being most pronounced with Punjab Deshi, less so with Sind Deshi and least of all with Punjab American. It should also be stressed that these results do not take into account the loss in colour, bloom, etc., which is over and above that sustained by the cotton in its spinning performance.

3 *Grader's Valuation*—Both bodies of experts, the Appeal Committee of the East India Cotton Association and the Board of the Karachi Cotton Association, agree that for *each type* of cotton the bales stacked in the thole yard would fetch a lower price than those stored inside a shed, thereby resulting in financial loss to the merchant, which may amount to several lakhs of rupees

(2) *Technological Bulletin, Series A, No 31*—"Quality of Lint in Relation to Ginning Factors"—The Bulletin describes the results of ginning tests on 9 Indian cottons, ranging in staple length from 0 70" to 0 94" and in mean fibre weight per inch from 0.109×10^{-6} oz to 0.269×10^{-6} oz. Each cotton was divided into four lots, two lots were passed through a saw gin with saw speeds of 325 r p m and 425 r p m, the other two lots were passed through a roller gin, the overlaps for the shorter cottons being $\frac{3}{8}$ " and $\frac{1}{8}$ " and those for the comparatively longer cottons $\frac{1}{8}$ " and $\frac{3}{8}$ ". Each lot was tested for mean fibre length and spun into two or three suitable counts, the yarns obtained being examined for breaking strength and neppiness. The mean fibre weight per inch of each sample was determined and fibre strength tests were made on the different lots of four cottons. From the experimental results the following conclusions are drawn—

1 The comparatively longer cottons gave a much higher out turn with the larger than with the smaller overlap. The difference between the out turns with the two overlaps diminished with the staple length of the cotton, and with the shortest cotton a higher out turn was obtained with the smaller overlap.

The higher saw speed gave a significantly higher out turn in the case of all cottons except one. The difference between the out turns with the two speeds was independent of the staple length of the cotton, but the various cottons showed a differential response in this respect.

2 For a majority of these cottons the greater overlap gave higher ginning percentage. However for cottons possessing a mean fibre weight of nearly 0.150×10^{-6} oz per inch, the reverse was found to be the case. The use of either of the two saw speeds did not make any appreciable difference to the ginning percentage in most cases.

3 For the short and medium staple Indian Cottons, an overlap of $\frac{3}{8}$ " was found to be quite sufficient, while for the comparatively longer types, better fibre results were obtained with an overlap of $\frac{1}{8}$ ". The lower speed was found to be more beneficial from the point of view of staple length of the ginned cotton, especially in the case of the comparatively longer types.

4 The values of the fibre strength of these cottons were unaffected either by the overlaps or the speeds employed in these tests.

5 The smaller of the two overlaps in the roller gin and the lower speed in the saw gin effected, on the whole, a greater degree of cleanliness, there by giving rise to somewhat smaller waste losses in the blow room

6 The differences between the card losses of the various lots of each cotton were insignificant

7 The number of yarn breakages in the ring frame were, on the whole, found to be fewer, with the smaller than with the greater overlap and with the higher than with the lower speed

8 On the whole, the lots ginned with the smaller overlap in the roller gin and the lower speed in the saw gin gave stronger yarns than the corresponding lots ginned with the greater overlap and the higher speed. This general statement, however, should be supplemented in each case by studying the individual response of the cottons to overlaps and speeds for which detailed results are given in the bulletin

9 The width of the overlap in the roller gin and the speed of saws in the saw gin, within the range employed in these tests, did not make any appreciable difference to the degree of yarn neppiness in the case of a majority of these cottons

(3) *Technological Bulletin, Series A, No 32* —“*The Effect of Employing Different Roller Settings and Twists on the Spinning Performance of three Indian Cottons*”—The object of the tests described in this bulletin was to study the effect on the spinning performance of Indian cottons of using different twists in the fly frames and roller settings in the ring frame. For this purpose three Indian cottons, namely, K 22, P.A 4F and Surat 1027 A L F were selected, the first being short and coarse, the second short but relatively fine and the third possessing a staple of medium length. The settings and twists normally employed at the Laboratory were taken as standard and these were varied on either side within the practical range

The mean fibre length and the fibre weight per inch of each of the three cottons were determined. Each cotton was processed with the different settings and twists and spun into suitable counts. The yarns obtained were examined forlea breaking strength, single thread strength, evenness, number of neps per yard, etc. The number of yarn breakages sustained by each doffing during the spinning process was recorded

From the experimental data the following conclusions are drawn.—

1 The two short staple cottons registered fewer yarn breakages in the ring frame with $1/16$ " than with $1/8$ " front roller setting. Among these the finer cotton responded better to the change in settings than the coarser one

2 The effect on the number of yarn breakages of changes in the settings of the other frames was either small or anomalous. It was clear that these effects were being masked by other factors, pointing to the desirability of further work.

3 Compared to the normal setting of the Laboratory, a closer front roller setting ($1/16''$ gauge) in the ring frame was decidedly beneficial to the strength of the resultant yarns with the two short stapled cottons, but was of doubtful value with the medium stapled cotton.

4 By using closer front roller setting in the ring frame with reduced twist, the improvement in strength was more pronounced.

5 As against this, closer settings and reduced twist in the three fly frames effected no change in the yarn strength of K 22, a very small improvement in that of P A 4F, and a reduction in that of Surat 1027 A L F.

6 Thus, on the whole, closer front roller settings in the rover and the ring frame are definitely advantageous with a short and coarse cotton like K 22, somewhat less so with a short but fine cotton like P A 4F, and of doubtful advantage with medium staple cotton like Surat 1027 A L F.

7 In order of merit the following order of roller settings is made:
roller set
it is made
fly frames

8 The effect of opening the front rollers on yarn strength is in the opposite direction to that of closer settings. With this change, the yarns, on the whole, are found to be weaker. As would be expected, wider settings are employed in the rover and the ring frame, and least of all when these alterations in settings are made in the fly frames.

“The Effect of Raising the
the Strength of Sindh Cotton”
were tested for strength with
the object of ascertaining the influence of the following factors:
the height of the top roller
(u) the weight of the top roller. For (u) the weight of the top roller was raised by means of specially
constrained roller stands so that its top surface stood respectively $1/32''$
and $2/32''$ above the tangent to the first and third rollers. For (u), the
weights of the top middle roller employed in these tests were 5 oz., 4 oz.,

3 oz, and 2 oz. For (u), the weights of the top back rollers used were $2\frac{1}{2}$ lbs and $3\frac{1}{2}$ lbs, respectively. The following conclusions are drawn from the results —

I *The effect of raising the middle roller from $1/32''$ to $2/32''$*

(i) Thelea breaking strength of the yarns spun with $2/32''$ middle roller elevation lies between 75 to 80 lbs, while that of the yarns for which the rollers were lifted by only $1/32''$ is only about 65 lbs. Thus, by a small change in elevation of the middle roller, an improvement of 10 to 15 lbs in test was obtained. This improvement is attributed to the better control exerted over the fibres when they are made to adopt a curved instead of a straight path in their passage through the rollers.

(ii) The best strength results were obtained when the ordinary top back roller was used in combination with $2/32''$ middle roller elevation, while the heavy back roller in combination with $1/32''$ middle roller elevation gave the poorest results.

(iii) The average difference in yarn strength on elevating the middle roller from $1/32''$ to $2/32''$ became progressively less as the weight of the middle roller was reduced, showing that the combination of the lighter top middle rollers with $2/32''$ elevation gave, on the whole, stronger yarns.

Both the interactions (ii) and (iii) show that a rigid control of the fibres as represented by a heavy back or middle roller is likely to give weaker yarns than relatively elastic control exerted by a comparatively lighter back or top middle roller.

II *The effect of using middle top rollers of different weights varying from 5 oz to 2 oz.* With $2/32''$ middle roller elevation, the use of the comparatively lighter 5 oz roller affected the yarn strength only slightly, while the use of the lighter middle rollers gave an increase in the yarn strength regardless of the weight of the top back roller.

III *The effects of using ordinary or the heavy back roller —*

the heavy back roller is, crease being greater with vation. It appears as if up of the bottom middle effect of using a heavy back roller.

(u) The adverse effect of using the heavy back roller becomes progressively less as the weight of the top middle roller is reduced, the only exception to the rule being the lightest of the four rollers weighing only 2 oz for which there is a reversal of the effect.

(5) *Technological Bulletin Series B, No 21 "A New Method and Apparatus for Determining the Average Length and Fineness of Cotton Hairs"*—A review of the previous work done on the relationship between the fibre properties and the spinning value of a cotton indicates that the two properties which contribute mostly to the spinning quality are the mean length and the weight per unit length. Consequently, rapid and accurate methods of determining these two properties should be of immense value not only to the cotton breeder, but also to the trade and industry. Several methods which are in vogue are briefly reviewed, of these the weight ratio methods are examined in greater detail in the present paper.

It is shown that the prevalent weight ratio methods involve the assumption that the variation of weight along the length of a fibre is negligible. This assumption has been found to be invalid by the recent work carried out by the author, which has shown that if this wrong assumption is made, the weight ratio method gives a value which is too low.

A new method, which remedies the above defect, is described in this paper. The essential features of this method consist in cutting a representative tuft of fibres, with one end in alignment, into three parts, the first part consisting of a certain length, the second part of a different length, and the third part of a third length. The average length of the whole tuft is obtained by adding up the individual lengths of the three parts. Furthermore, the fibre weight per unit length may also be determined by counting the number of fibres in the first section prior to weighing and dividing the weight of the tuft by the number of fibres and the average length.

(6) *Miscellaneous Publication*—"A Device for Mounting Cotton Hairs for Examination of Fibre Maturity"—This note describes a microscopical device which facilitates the examination of the maturity of cotton hairs.

(7) *Miscellaneous Publication*—"A Note on a New Type of Progressive Damage to the Structure of Cotton Hair caused by Micro organisms"—While investigating the causes of deterioration of Broach Cotton, a type of damage to the structure of cotton fibre was discovered which does not appear to

have been described by the earlier workers. The chief characteristics of this damage are that (1) it commences from the usual seat of organismal infection, i.e., the basal end or a tear in any other part of the fibre, and (2) it slowly progresses internally disintegrating and corroding the cell wall, leaving intact merely cuticular sheath. The cell-wall gradually tapers from the unaffected portion into the affected one. Nine photo micro graphs are reproduced in support of the observation.

(8) *Technological Leaflet No 5* "The Influence of Method of Picking on the Quality of Cambodia Cotton"—Two samples of Cambodia cotton, grown in Salem (Madras Presidency), from the same seed and under as nearly identical conditions as possible, were tested at the Laboratory. One sample was picked according to the method commonly employed by the local cultivators while the other sample was picked according to the improved method recommended by the Madras Agricultural Department. In the former method the coolies are allowed twice a week usually, to collect the seed cotton in gunny bags, regardless of whether they are fully ripe or immature. In the improved method, the cultivators are advised to pick the *kapas* only from the fully opened and mature bolls and to leave the locules in the plant itself. This method is not only cheaper and less wasteful than the old one followed by the cultivators, but also yields lint of better quality. The results of the tests carried out on these two samples showed that the sample picked according to the method recommended by the Agricultural Department was superior to the other sample in every respect. It contained a higher percentage of mature fibres, gave 3 per cent less total loss in the opening and cleaning processes, registered fewer breakages in the ring frame and the yarns spun from it were definitely stronger and less neppy than those given by the sample picked according to the cultivator's method. Thus, the cotton picked by the improved method, had gained both in grade and quality and the agriculturists would stand to gain materially by following the method recommended by the Department.

V GENERAL

Visitors—His Excellency the Governor of Bombay very kindly paid a visit to the Laboratory on 6th April 1936. He was received at the Laboratory by Sir Purshotamdas Thakurdas, Mr. Rama Reddi and the writer, who conducted him round the various sections of the Laboratory and showed him the work which was being done in each section. His Excellency evinced very great interest in the work of the Laboratory and put numerous questions regarding the condition of the Indian cottons in the Laboratory, especially in relation to it in particular. The visit actually lasted for an hour and a half after which he was pleased to express his appreciation of the work seen by him.

The Hon'ble Kunwar Sir Jagadish Prasad, Kt, C I E, O B E, Member of the Viceroy's Executive Council in charge of the Education, Health and Lands Department visited the Laboratory on the 10th January 1936

The Hon'ble Chowdhry Sir Mohamed Zafrullakhan, Kt, Member of the Viceroy's Executive Council in charge of the Department of Commerce and Railways visited the Laboratory on the 23rd July 1936

Among the others who visited the Laboratory during the period under review mention may be made of the following —

- (1) 25 Post graduate students of the Royal Institute of Science, Bombay
- (2) 52 students and 4 teachers of the Agricultural College, Poona
- (3) 16 students of the Government Textile School, Cawnpore
- (4) Fellows of the Academy and Members of the Reception Committee of the Indian Academy of Sciences
- (5) 15 Research Students of the Physics Laboratory of the Dacca University, Ramna
- (6) 19 First Year B Sc students of the Allahabad Agricultural Institute, Allahabad
- (7) 27 students of the Baroda Agricultural School, Baroda
- (8) 15 students of the Kala Bhavan Technical Institute, Baroda

The Technological Assistants working at the mofussil laboratories attended the Laboratory with the exception of Mr S Rajaraman, Technological Assistant, Lyallpur, in December 1935 for the Refresher Course and the Conference. The Conference of the Senior Members of the Laboratory and the Technological Assistants took place on the 6th and 7th December 1935

Staff — Details regarding the technical staff employed in the Laboratory will be found in *Appendix XV*, while leave and other arrangements made during the period under review are mentioned below

Mr D L Sen proceeded on study leave to join the College of Technology, Manchester, on the 20th September 1935

Mr Hari Rao proceeded on leave from the 14th April 1936 to 23rd May 1936 and in his absence Mr R S Koshal supervised the work of the Fibre Testing Section

Mr V Venkataraman, Statistician and Personal Assistant, was given leave on medical certificate from the 9th March 1936 to 12th June 1936 during which period his post remained vacant

Mr A N Gulati, Microscopist, was on leave on medical certificate from 15th April 1936 to 1st July 1936

Mr A B Khan Junior Tester resigned his post on 3rd September 1936 to prosecute further studies, and Mr S N Rao was appointed in his place

Mr S Raja Raman, Technological Assistant Lyallpur, completed his training at the Laboratory on the 11th September 1935 and proceeded to Lyallpur to join his duties. Mr K G Deo, who was transferred to Lyallpur to officiate as Technological Assistant, reverted to his substantive post of Junior Tester in the Laboratory

In order to cope with the increase in the work of the fibre and the yarn testing sections provision for four posts of temporary Junior Testers for a period of three months each had been made in the current year's budget. These posts were filled by the appointment of Messrs B N Prabhakar, S M Nawaz J S Deshpande and G Hurry who worked in the Laboratory from the 2nd December 1935 to 1st March 1936

As in the past, two students from outside Messrs S Dinakaran and B V Vora were selected for training at the Laboratory from 2nd December 1935 for a period of six months. Their period of training expired on the 31st May 1936

During the period under review two Research Scholarships were awarded to Messrs G Ram Rau and M U Parmar and they joined duties on the 20th and 16th January 1936 respectively

Mr W D Saleem was appointed Junior Tester to fill up the post rendered vacant due to the resignation of Mr M R Raut

Mr B N Prabhakar was appointed on the 14th April 1936 as Junior Tester to fill up the post rendered vacant due to the resignation of Mr W D Saleem

Mr V Venkataraman continued to hold the temporary post of Personal Assistant in addition to his own duties

Mr H B Joshi continued to be in charge of the Yarn Testing Section

The working hours of the Laboratory were increased by one hour from 15th August 1936

Equipment —During the period under review the following machines and apparatus were added to the equipment of the Laboratory —

(a) *Machines*

- (1) One Shirley Analyser
- (2) One Fractional H P Motor

(b) *Apparatus*

- (1) Leeds and Northrop Galvanometer
- (2) Bosch and Lomb's Euscope with adjustable microscope lamp
- (3) One Protractor eye-piece with adaptor
- (4) Dr J Saxl's Evenness Tester

ACKNOWLEDGMENTS

It gives me pleasure to express my deep sense of gratefulness to the office bearers of the Indian Central Cotton Committee for their unfailing support and valuable suggestions, to Mr Varjivandas Motilal for his kindness in valuing the cotton samples, to the office bearers of the East India Cotton Association and the Millowners' Associations of Bombay and Ahmedabad for their help in supplying samples of trade varieties. My best thanks are also due to the staff of the Laboratory for their loyal co operation and many fruitful suggestions which made it possible for me to complete the work described in this report

NAZIR AHMAD,

Director,

Technological Laboratory

Dated the 24th November 1936

CHAPTER VII.

REPORT OF THE PUBLICITY AND PROPAGANDA OFFICER FOR THE YEAR ENDING 31st AUGUST 1936.

INTRODUCTION

THE Indian Central Cotton Committee's Publicity and Propaganda Department has made steady progress during the period covered by this Report, in interpreting both in India and abroad, the facts of scientific research work carried on. The Department has directed its efforts along two main channels, firstly, wide press publicity both in India and abroad for disseminating knowledge of improvements effected in the quality of Indian cottons, and secondly vigorous field propaganda by the Publicity Officer in person in collaboration with Provincial

could lay its hands on them quickly and easily. In the second group are included propaganda tours in different provinces of India to carry the fruits of experimental work to the grower and other interests concerned.

ANTI-GOGHARI PROPAGANDA.

The notable event during the year under report was a determined drive initiated by the Department of Agriculture, Bombay, with the Committee's active co-operation to eliminate the inferior cotton known as *Goghari* from the Surat tract. This type of cotton has been found to be undesirable not only in itself but also because it is mixed with superior varieties, thereby spoiling the reputation of one of the finest Indian cotton, *Narsari* 1027 A L F. The united efforts of the Department of Agriculture, Bombay and the Indian Central Cotton Committee to eradicate this inferior variety of cotton from the Surat tract met with only partial success. The main factor which stood in the way of complete success was the higher ginning percentage of the inferior variety. The trader encouraged mixing of the two varieties so as to be able to palm off the mixture as genuine *Narsari*.

To put an end to this evil practice of mixing, legislative prohibition for cultivation of *Goghari* was considered the only means. The Bombay Government accordingly brought forward the bill to prohibit the cultivation of *Goghari* cotton and the mixing of such cottons with other cottons, etc., etc., which has since become law.

In the work of securing the support of the members of the Bombay Legislative Council for the measure, the Publicity Department played its part. An illustrated pamphlet, a hand bill and a special article were prepared and distributed to the members at Poona and at the extended session of the Council in Bombay.

A special demonstration was staged in a large *shamiana* in the compound of the Council Hall at Poona. Samples of 1027 *A L F*, *Goghari* and mixed *kapas*, yarn exhibits, etc., prepared at the Committee's Technological Laboratory at Matunga, were placed on view, together with Baer putterns of 1027 *A L F*, *Goghari* and mixture, combed halos of 1027 *A L F* and *Goghari* and photos, charts, graphs, diagrams, pictures, etc., showing the characters and monetary value of the two varieties as well as of their mixture. The demonstration was organised in a manner calculated to please as well as instruct at a time when the session of the Legislative Council was in progress and was acknowledged to be a source of enlightenment and profit to the members representing agricultural, trade and industrial interests.

A similar demonstration, although on a smaller scale, was held at the extended session of the Council in Bombay which finally passed the measure into law.

The *Times of India*, the *Bombay Chronicle* and local vernacular papers evinced great interest in this important measure and published a special article on the subject. The *Times of India* made appreciative editorial comments upon the Publicity Department's unceasing campaign for educating the members of the Council on the urgent need for the measure.

Following on the passage of the Bombay Cotton Control Bill of 1935 and a similar bill penalising *Goghari* cotton in Baroda and in pursuance of the decision taken by the Committee at its 32nd meeting to pursue propaganda work against *Goghari* in the district of Surat and Navsari *Prant*, the Publicity Officer devoted a large portion of his time in the preparation of illustrated pamphlets, the anti *Goghari* poster "Get rid of the weight", placards, etc., to help forward the campaign and extend it to villages. Rightly alert to the much desired elimination of inferior *Goghari* the officers of the Agricultural Departments of Bombay and Baroda had before the big drive was launched carried on in the past the educational work in territories south of Nerbudda river, from Ankleshwar to Bilimora, Vyara and Anawal in the Surat district and in the Navsari *Prant* in the Gaekwar's territory, inducing cultivators to grow the pure 1027 *A L F* type, in wake of the pioneering attempts of Sir Purshotamdas Thakurdas, Vice President of the Indian Central Cotton Committee, who was the first to stress the need of putting a complete stop to the growing of *Goghari* and to seek Government's co operation in enforcing measures to that effect. But in spite of it, *Goghari* assumed alarming proportions in some villages of Jalalpur Taluqa and Navsari *Prant*.

Supplementing the above efforts, the Publicity Officer of the Indian Central Cotton Committee, accompanied by the Cotton Superintendent, Surat, and Cotton Officer, Narsari, and the staff, carried out a campaign of propaganda, visited a large number of centres and villages in the British and Baroda territories, addressed meetings of growers and interviewed growers, merchants, commission agents and export firms, to unify the thinking and action, acquainting them with facts about *Goghari*, the disadvantages of mixing the two varieties, the necessity for checking the evil, provisions of the Acts and their basic objects designed to improve the economic condition of the interests concerned by increasing the net return for cotton which was their mainstay and brought them more than 30 lakhs of rupees per year for their output of $1\frac{1}{2}$ lakhs of bales from the cotton tract South of Nerbudda river, the work of the Indian Central Cotton Committee's schemes to improve and develop cottons in Surat and Baroda and their active co-operation in its endeavour to establish the reputation of the *Narsari* cotton which was highly prized in India and abroad for its fine long staple

most important steps was to plan and get under way far reaching propaganda campaign, designed to reach every grower and ginner of *Goghari* whom it was possible to reach, and to convince them of the advantages of keeping 1027 A L F pure

By giving talks, by issuing literature, displaying posters, distributing placards, and by personal interviews and other available mediums, public opinion in favour of the measures was successfully mobilized which contributed towards better understanding of the concerted action of the Departments of Agriculture and the Indian Central Cotton Committee even in remote villages

The co-operation of the Press to help forward the campaign in the districts was again noteworthy. Interviews to the press correspondents were given and these resulted into the *Times of India* reproducing poster "Get rid of the weight twice with a descriptive note regarding the poster and an account of the work which was being done in Surat and Baroda for the improvement of cotton

The *Gujerati* of Surat and *Sayaji Vijaya* an official organ of Baroda State, besides reproducing the poster wrote leading articles in support of the campaign. An account of the activities of the Committee's Publicity and Propaganda Officer in affected areas was also published

Literature was supplied to the Press and by these means a good press and general publicity was secured

The programme of the campaigns was immediately successful and the response from the interests connected with cotton was very fine and encouraging

EXHIBITIONS

There are no better mediums than exhibitions and fairs in the civilised countries all over the world as the most effective and important means of knowing how far and in what manner the industries and commerce of a nation are able to meet the demands of its life, whether articles manufactured for the use of a people are of a right quality and type

One such notable exhibition in which the Publicity Department of the Committee participated was the Rural Life Exhibition at Baroda which lasted for two weeks commencing from the 1st January, 1936. This Exhibition was organised in celebration of the Diamond Jubilee of H. H. the Maharaja of Baroda, and represented a true picture of life springs of agricultural, commercial and industrial development made in that part of the country and an object lesson for the systematic dissemination of those facts which are of the greatest value to the producer, the consumer and the distributor

The exhibition attracted thousands of visitors, farmers, merchants, manufacturers and members of every class of society

Occupying as it did an extensive *maidan*, the exhibition was able to accommodate hundreds of stalls. Side by side with the show of the Agricultural Department the stall of the Indian Central Cotton Committee was organized in a striking manner to fulfil a mission of no small significance namely to make known to the public the eminent part the Indian Central Cotton Committee was playing in the agricultural and industrial advancement of the country. A number of cotton exhibits kindly placed at the department's disposal by the Director of the Technological Laboratory, a large number of photos and charts showing the superiority of 1027 *A.L.F.* cotton over *Goghari* posters and other publications of the Publicity Department were on view at the exhibition. The Committee's participation was a great success and numerous comments were heard from cotton interests and the general public who thronged the stall, that so noticeable an improvement has schemes varieties proved to be a great educational agency in the dissemination of knowledge cost lbs

2 All India Industrial Exhibition, Delhi

A sufficient number of posters, pamphlets and other publications which were considered to be of use in Northern India were sent for use in the exhibition. The Publicity Officer who at the time was engaged in the preparation of propaganda material for Surat and Baroda campaigns was

unable personally to take part in the exhibition. The Secretary of the exhibition in a letter on the usefulness of posters and literature of the department said "The posters were interesting and always there was a big crowd at places where the posters were displayed. The literature also seemed to have effected good results because it contained valuable information and people liked to receive the literature with great interest."

3 *The Fair in Rajputana*

At the request of the Extension Officer of the Institute of Plant Industry, Indore, Publicity and Propaganda literature and posters of the Publicity Department were supplied for demonstration and distribution purposes at the fair.

Crop Demonstration in Amraoti and Yeotmal

At the request of the Extra Assistant Director of Agriculture, Amraoti, suitable propaganda literature was sent to him for use in connection with the demonstration of improved crops held in Amraoti and Yeotmal districts.

4 *Fairs and Demonstration in Warora, Central Provinces*

Publications of the Department were also supplied to (1) the Agricultural Assistant, Warora, Central Provinces, and (2) the Deputy Director of Agriculture, Gujerat, in connection with village uplift work in several villages which were visited by H. E. the Governor of Bombay.

PRESS COMMUNIQUEs

The following press *communiqués* were issued during the year under report —

- 1 *Elimination of Goghari cotton from Surat tract*
- 2 *Development of cotton cultivation in Sind*
- 3 *Combining of good quality Indian cottons*
- 4 *Development of cotton growing in Bombay Presidency*
- 5 *Facilities for training at the Technological Laboratory, Matunga*
- 6 *Amalner Cotton Market*
- 7 *Fibre maturity in relation to fibre and yarn characteristics of Indian cottons*
- 8 *The 31st Half yearly meeting of the Indian Central Cotton Committee*
- 9 *The 32nd Half yearly meeting of the Indian Central Cotton Committee*
- 10 *Improved varieties of cotton in Sind and their cultivation*
- 11 *Review of last year's developments*
- 12 *Seed distribution and extension schemes*
- 13 *Improvement of cotton in India*
- 14 *Review of the brochure on cotton research in India*
- 15 *Effects of storing cotton bales in the open and inside a shed at Karachi.*

SPECIAL ARTICLE

Elimination of Goghari cotton from Surat tract — This special article was issued to bring home to the members of the Bombay Legislative Council, the agriculturists in Surat and the trade in general the necessity for the eradication of *Goghari* cotton from the Surat tract, in view of the great damage done to the reputation of the superior variety 1027 *A L F* by the mixing of both the varieties and passing the mixture off as genuine *Narsari* cotton. Legislative intervention was the only means of salvaging the reputation of the *Narsari* cotton.

PAMPHLETS

In addition to
Propaganda Depart
results of study of
were

the Publicity and
etc, setting forth
pamphlets issued

- 1 "*Elimination of Goghari from the Surat tract will re establish the reputation of Narsari cotton*

This pamphlet explains the superiority in quality and value of *Narsari* 1027 *A L F* cotton as compared with *Goghari*, the disadvantages of mixing these two varieties and the views on the question of those affected by the evil of mixing. This pamphlet was specially prepared in connection with the anti *Goghari* propaganda campaign launched by the department, when the question of elimination of *Goghari* cotton from the Surat tract was before the Bombay Legislative Council.

- 2 A Gujarati version of this pamphlet was also brought out for propaganda in the Baroda State

- 3 "*Spotted Boll worms (Earias Fabia insulana) in South Gujarat*"

This is a popular thoroughly illust
monograph published by the Imperia

This deals with the results of the Surat
the investigations made from 1923 to 1934 on the Spotted Boll worm in

efficiency of control measures

- 4 "*The Indian Central Cotton Committee, its objects, activities and achievements*"

This pamphlet gives a comprehensive description of the Committee's varied activities and its achievements in the legislation designed to promote the production, marketing and manufacture of Indian cottons and in the sphere of research

In order to reach a wider public, this pamphlet was translated from English into the provincial languages such as Marathi, Gujarati, Urdu, Hindi, Tamil and Telugu

5 "*Summary Proceedings of the 32nd meeting of the Indian Central Cotton Committee*"

This was an impersonal summary setting forth the main points brought out during discussions without mentioning the names of the speakers

6 A handy illustrated pamphlet is under print, setting forth the aims and achievements of the Indian Central Cotton Committee, for distribution during the forthcoming United Provinces Industrial and Agricultural Exhibition at Lucknow

POSTERS

Get Rid of the Weight

The four coloured poster was specially prepared to help forward the campaign for the elimination of *Goghari* from the Surat and Baroda tracts. It is a vivid picturization of the handicap which *Goghari* constitutes to the cultivators' efforts to obtain better prices for his product. It lends point to the exhortation to get rid of the short staple variety of cotton grown in Surat and Baroda which is greatly responsible for the deterioration in the quality of 1027 *A L F*

The preparation of a suitable poster for *B D 8* cotton in Gujarati was also taken in hand

The idea of replacing the poster "*India's bid for Supremacy in world's Cotton Markets*" with a different attractive design and latest available figures was also taken in hand. To cope with the immediate demand for this poster a number of copies of the old edition was brought up to date and printed

LEAFLETS

The Gujarati leaflet on the uses of plant puller was reprinted a third time to meet increased demand from Baroda and other places

HANDBILLS

1 The Plant Puller handbill was also reprinted a third time in Gujarati in order to meet heavy demand from the Director of Agriculture, Baroda

2 "Save Indian Cottons"

The handbill was prepared in connection with the efforts made by the Publicity and Propaganda Department to eliminate *Goghari*. A Gujarati version, with necessary modifications, was also prepared in connection with a similar campaign proposed to be conducted in Baroda.

PLACARDS

A placard explaining the gist of legislative measures prohibiting the growing of the *Goghari*, and directing the growers to obtain pure seed of 1027 *A L F* from nearest Government Depôts was also prepared in English and Gujarati.

DEMAND FOR PUBLICITY LITERATURE AND GREATER NUMBER OF ENQUIRIES

The year now under review was remarkable for an increased demand for the publications of the Department as well as for special information bearing on the Committee's work. A large number of enquiries from Government institutions, trade associations, private concerns and interested individuals were attended to. Its help was sought for information on scientific investigations, based on the latest knowledge of marketing and other problems in connection with the improvement and export of Indian cotton. These enquiries encouraged the belief that the widening of the informational service has attracted increasing attention from both the trade and the general public, here and abroad.

PUBLICITY OFFICER'S TOURS

During the year under report the Publicity and Propaganda Officer paid visits to Poona, Surat, Baroda and Navsari and toured through many . . . with the Anti *Goghari* . . . with cotton interests . . . bute towards a better . . . ovement of cotton in . . . nd to offer them the services of the Department in this respect. With the help of the Officers of the Department of Agriculture, Bombay and Baroda, the Publicity and Propaganda Officer followed a rationally adjusted working plan for the campaigns that made the most effective success, as reflected in the earlier pages of this report.

APPRECIATION OF COMMITTEES WORK

In assessing the value of the Committee's work, several newspapers, both in India and outside, have from time to time written in appreciative terms. For instance, the *Times of India*, commenting on His Excellency

the Governor's address at the 31st half yearly meeting of the Indian Central Cotton Committee in which His Excellency referred to Lancashire's readiness to make more use of Indian cotton, if uniformity in quality was assured, observed as follows

"to this persistent publicity and propaganda are essential, the Indian Committee are awake to this need. Its Publicity and Propaganda Department has been instrumental in checking to some extent the evils formerly prevalent in the cotton trade. Particularly successful was its campaign for the elimination of the boll-worm pest in Surat, which adversely affected the quality of the local crop. Its task will be con-

His Excellency the Governor of Bombay
yearly meeting of the Indian Central Cotton
made reference to Publicity and Propaganda
following terms "Through its propaganda agency your Committee with
the immense authority of its store of knowledge and experience wields a
great power for the improvement of the cultivation and trade of this Presi-
dency. Bombay is above all the cotton province of India and any improve-
ment in production, marketing or export will benefit a very large section of
the population. The difficulty in the way of improvement is very largely
that of convincing growers and traders of the resultant benefits. The culti-
vator is naturally conservative. It is indeed hardly reasonable to expect him
to display much individual originality and initiative. Demonstration and
propaganda are necessary to convince him that it pays in the long run to
spend more on better seed, to root up old cotton stumps and to keep cotton
free from admixture of inferior kinds and of dirt and rubbish. The Com-
mittee is admirably equipped for this purpose and has already done much
by bringing home directly to the guilty party any departure from the
specified standard of quality in cotton bales."

R. D. MIHRA,
Publicity and Propaganda Officer

APPENDIX I.

MEMBERS OF THE COMMITTEE

(1) PRESIDENT —

Sir Bryce Burt, Kt, C.I.E., M.B.E., I.A.S., Offg. Vice Chairman, Imperial Council of Agricultural Research, *ex-officio*

(a) The Expert Adviser to the Imperial Council of Agricultural Research in Agricultural matters, *ex-officio*

(2) REPRESENTATIVES OF AGRICULTURAL DEPARTMENTS —

Madras	M R Rao Rao Bahadur D Ananda Rao Garu, I.A.S.
Bombay	The Director of Agriculture
United Provinces	Mr J H Ritchie, I.A.S., Director of Agriculture
Punjab	The Director of Agriculture
Central Provinces	Mr J C McDougall, I.A.S., Director of Agriculture
Burma	Mr F D Odell, I.A.S., Deputy Director of Agriculture, West Central Circle, Magwe

(3) THE DIRECTOR GENERAL OF COMMERCIAL INTELLIGENCE AND STATISTICS *ex-officio*

(4) REPRESENTATIVES OF CHAMBERS OF COMMERCE AND ASSOCIATIONS—

The East India Cotton Association	Sir Furshotamdas Thakurdas Kt, C.I.E., M.B.E. (<i>Vice President</i>)
The Bombay Millowners' Association	Mr S D Saklatvala, M.L.C.
" " " " " "	Mr M S Durutti.
" " " " " "	Mr Chunilal B Mehta
" " " " " "	Mr A P Darlow
" " " " " "	Seth Sakarlal Balabhai, M.L.C.
The Tuticorin Chamber of Commerce	Mr J Vonesch
The Upper India Chamber of Commerce	Mr J Tinker
The Empire Cotton Growing Corporation	Mr W Roberts C.I.E.

(5) AND (6) COMMERCIAL REPRESENTATIVES NOMINATED BY LOCAL GOVERNMENTS—

Central Provinces	{ Mr Y G Deshpande Mr D K Kane
Madras	Mr J Nuttall
Punjab	Khan Bahadur Sardar Habibullah, M.L.C.
Bengal	Mr Akhil Bandhu Guha.

(7) CO OPERATIVE BANKING REPRESENTATIVE—

Sir Chunilal V Mehta K.C.S.I.

(8) REPRESENTATIVES OF COTTON GROWING INDUSTRY—

<i>Madras</i>	{ Mr K S Ramaswami Gownder Mr R. Ry. Rao Bahadur B P Sessa Reddi Garu M.L.C
<i>Bombay</i>	{ Sardar Rao Bahadur Bhimbhai Ranchodji Naik, M.L.C Rao Bahadur C S Shurahatti
<i>United Provinces</i>	{ Khan Bahadur Shah Nazar Hussain M.L.C Rai Bahadur Lala Anand Sarup M.L.C
<i>Punjab</i>	{ Sardar Sah b Gurbachan Singh M.L.C Mian Nurullah M.L.C
<i>Central Provinces and Berar</i>	{ Rao Bahadur M G Deshpande C.B.E Mr M P Kolhe M.L.C

(9) AND (10) REPRESENTATIVES OF INDIAN STATES—

<i>Hyderabad State</i>	Mr Nizam ud Din Hyder Director of Agriculture
<i>Baroda State</i>	Mr R G Allan C.I.E. Commissioner of Agriculture
<i>Gwalior State</i>	Mr H H Pandya Director of Agriculture
<i>Rajputana and Central India States</i>	Vacant *

(11) ADDITIONAL MEMBERS NOMINATED BY THE GOVERNOR GENERAL IN COUNCIL—

- 1 Mr D N Mahta Economic Botanist for Cotton Central Provinces
- 2 Rao Bahadur S S Salunath Deputy Director of Agriculture Southern Division Dharwar
- 3 Dr V K Badami Ph.D. Deputy Director Department of Agriculture in Mysore State Bangalore
- 4 Mr R. Ry. V Ramanatha Ayyar Avl Cotton Specialist Coimbatore
- 5 Musahib i Khas Bahadur S V Kanungo Finance Minister Holkar State Representative of the Holkar State
- 6 Mr W J Jenkins I.A.S. Chief Agricultural Officer in Sind Karachi
- 7 Seth Isserdas Varindmal Representative of the Karachi Indian Merchants Association
- 8 Mr P B Richards I.A.S. Entomologist to Government United Provinces
- 9 Mr Sayed Miran Muhammad Shah M.A.C. 50 Cantonment Hyderabad Sind
- 10 Khan Sahib Farukh Beg Sadik Ali Beg Mirza Nawab Shah Sind
- 11 Lala Shri Ram Representative of the Cotton Millowners of Delhi
- 12 Mr Chellaram Shewaram Representative of the Karachi Cotton Association, Ltd.
- 13 Dewan Bahadur Sir T Vijayaraghavacharya K.B.E

* Since filled in by Mr T R. Low I.A.S.

- I *The President*—Sir Bryce Burt
 II *The Vice President*—(ex officio)
 III *The Director Institute of Plant Industry*—(ex officio)
 IV *The Co operative Banking Representative*—Sir Chundal V Mehta (ex officio)
 V *Cotton Growers Representatives*—Mr W Roberts Mian Nurullah Vacant
 (one seat)
 VI *Cotton Trade Representatives*—Mr Chundal B Mehta, Vacant (one seat)
 VII *Agricultural Officers*—Dr W Burns Mr J H Ritchie Mr H R Stewart
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 VIII *Co-opted Members*—Mr Mohammad Afzal Rai Saheb Kalidas Sawhney
 Mr J B Hutchinson Mr Chellaram Shewaram and
 IX *The Secretary*

TECHNOLOGICAL RESEARCH SUB COMMITTEE

The President (<i>Ex-officio</i>)	Mr J Finker
Sir Purshotamdas Thakurdas	Mr M S Durutti
Dr W. Burns	Mr Y G Deshpande
Mr H R Stewart	Lala Shri Ram
Mr Chunilal B Mehta	Mr N Brodie (<i>Co opted</i>)
Seth Sakarlal Balabhai	Dr Nazir Ahmad
Rao Bahadur D Ananda Rao Garu	Vacant (one seat)
Mr S D Saklatvala	
Mr A D Walwyn, Mr Dharamsi Mulraj Khatau (Representing the Bombay Mill-owners' Association)	
Mr Kasturbhai Lalbhai, Seth Chamanlal G Parekh (Representing the Ahmedabad Millowners' Association)	
Mr R G Saraiya Mr Jamnadas Ramdas (Representing the East India Cotton Association, Ltd)	
Seth Isserdas Varindmal, (Representing the Karachi Cotton Association, Ltd)	

RESEARCH STUDENTS SELECTION SUB COMMITTEE

The President	Mr W J Jenkins
The Vice President	Mr J C McDougall
Dr W Burns	Mr H H Pandya
Mr H R Stewart	Mr Nizam ud Din Hyder
Mr J H Ritchie	Dr Nazir Ahmad
Mr R G Allan	Dr V K Badami
Mr P B Richards	Vacant (two seats)
Rao Bahadur D Ananda Rao Garu	

COTTON FORECAST IMPROVEMENT SUB COMMITTEE

The President	
The Director General of Commercial Intelligence and Statistics	Calcutta
The Director of Agriculture	Bombay Presidency
Do	Punjab
Do	Madras
Do	United Provinces
Do	Central Provinces

The Statistical Officer, Board of Revenue, Madras.

SPECIAL SUB COMMITTEE ON WIDER MARKETS FOR INDIAN COTTON

The President	Mr J. C McDougall.
The Vice President	Khan Bahadur Sardar Habibullah.
Mr H R Stewart	Sardar Rao Bahadur Bhumbhai Ranshodji Naik.
Mr J H. Ritchie	Rao Bahadur D Ananda Rao Garu
Dr W Burns.	Mr Nizam ud Din Hyder
Mr S D Saklatvala	Mr W J Jenkins.
Mr J Vonesch	Mr Kasturbhai Lalbhai, Seth Isserdas
Mr Chunilal B Mehta	Varindmal, Mr R G Saraiya, (Co opted)
Mr Y G Deshpande	
Mr W Roberts	Vacant (one seat)

STANDARDS SUB-COMMITTEE.

Mr W Roberts (Representing the Imperial Council of Agricultural Research)
Mr Haridas Madhavdas, Mr Varjivandas Motilal (Representing the East India Cotton Association, Ltd)
Mr A. P Darlow, Mr Kisharam Lekhray (Representing the Karachi Cotton Association, Ltd.)
Mr N M Deshmukh, Rao Bahadur G R Kothare (Representatives of cotton growers of Berar Tract)
Mr Himatlal Jagjiwandas Vadodaria, Mr Vadilal Chunilal Doshi, (Representatives of cotton growers of Mathia Tract)
Mr Akhubaya Takhtasinghji Chudasama Rao Saheb Keralbhai Desai, (Representatives of cotton growers of Dhollera Tract)
Mr Haribhai Jhaveribhai Amun, Mr Ardeskar Jamshedji Kapadia, (Representatives of cotton growers of Broach Tract)
Sardar C B Naik Bahadur Desai, Rao Bahadur B L Patil (Representatives of cotton growers of Kumpta Tract)

APPENDIX III.

LIST OF RESOLUTIONS

"The Indian Central Cotton Committee notes with great satisfaction the Knighthood conferred on the acting President and tenders its cordial congratulations to Sir Bryce Burt on the high honour conferred on him"

"That the Indian Central Cotton Committee notes with satisfaction the expeditious manner in which the Bombay Cotton Control Act was passed by the Legislative Council. It is confident that this piece of legislation will go a long way towards improving the quality of cotton of the Surat tract where *Goghari* has been spreading to an alarming extent and that the benefits to the grower expected from the Act will soon be realised"

"That the recommendation of the Standing Finance Sub Committee that the Government of India be requested to make permanent the present fees for the fumigation of American cotton of Rs. 2 7 0 per square bale and of Re 1 8 0 per round bale be approved."

"The Committee is of the opinion that the Government of India should be requested to make permanent the present fees for the fumigation of American cotton of Rs. 2 7 0 per square bale and of Re 1 8 0 per round bale be approved."

"The Indian Central Cotton Committee congratulates the Bombay Government for the rapid progress they have made with the introduction of the Bombay Cotton Ginning and Pressing Factories (Amendment) Bill in the Bombay Legislative Council"

"The Indian Central Cotton Committee endorses the recommendation of the Local Sub Committee regarding the detailed provisions in the Central Provinces Cotton Ginning and Pressing Factories (Amendment) Bill for dealing with watering excessive seed, introduction of extraneous matter and mixing of different kinds of cotton"

"The Committee resolves that the complaint from Dhulia be reported to the Government of Bombay for effective prevention of this sort of malpractices reported by means of the Bombay Cotton Ginning and Pressing Factories (Amendment) Act"

"The Indian Central Cotton Committee desires to express its very great regret at the sudden and tragic death of Dr F J F Shaw and wishes to convey its most sincere sympathy to Mrs Shaw and her family in their great loss."

"The Indian Central Cotton Committee places on record its satisfaction that the Governments of Bombay and the Central Provinces have passed legislation for the control of cotton ginning and pressing factories. The Committee has no doubt that this measure will go a far way in suppressing the malpractices which are detrimental to the cotton trade in those provinces."

"The Indian Central Cotton Committee urges on the Government of Sind the necessity of taking very early steps to make the Cotton Ginning and Pressing Factories (Bombay Amendment) Act effective in that province by framing rules as early as possible before malpractices become established in the newly developed cotton tracts of that province"

"That the Indian Central Cotton Committee notes with satisfaction the continued efforts of the Lancashire Indian Cotton Committee to extend the use of Indian cotton in Lancashire and trusts that the good work being done by that body will be of mutual advantage to both countries

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APPENDIX IV.

INSTITUTE OF PLANT INDUSTRY, INDORE.

Annual Report for the Year ending June 30th, 1936

The Institute of Plant Industry is a Society registered under the Holkar State Societies Registration Act and its primary objects are —

- (a) The investigation of all matters relating to the production and improvement of raw cotton in India
- (b) The agricultural development of the Indian States which are members of the Society
- (c) The training of officers and cultivators nominated by such States
- (d) The training of advanced students nominated by the Indian Central Cotton Committee

Its funds are derived entirely from subscriptions. In the financial year 1935-36 the Indian Central Cotton Committee made a grant of Rs. 97,600 and the member States in Central India and Rajputana subscribed Rs. 67,335.

The Institute is subsidised by the Indian Central Cotton Committee primarily in —

and Rajputana.

The interests of the member States lie in the investigation of the specific crop problems of their own territory, and in the development and dissemination of better seeds and more efficient agricultural practices.

The interests of the Indian Central Cotton Committee and of the member States are complementary, and provide a very satisfactory balance to the work of the Institute.

The Governing Body of the Institute is representative of the Cotton Committee and the member States, and its President is the Agent to the Governor General in Central India, *ex officio*. The Director of the Institute is also Agricultural Adviser to States in Central India and Rajputana, and in addition represents all those States upon the Indian Central Cotton Committee.

ADMINISTRATIVE AND GENERAL.

1. *General and Board of Governors' Meetings*—The fourth General Meeting of Members of the Society was held on January 31st, 1936, when discussion took place on —
It was decided not —
ing the States' repre —
and Jodhpur, each to —

The Board of Governors at its 16th Meeting held on the following day decided that —

The report for the year 1937-38 is now being prepared and the amount

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to Ceylon conditions That a commercial firm should make such voluntary payments as
clear proof of the value of this process and of the Institute's co operation

At the closing date of this report the following twenty five States and Thikanas were
members of the Institute, arranged in order of joining —

Indore	Tonk	Orchha
Dhar	Bijawar	Jodhpur
Jaora	Barwan	Alwar
Datia	Bikaner	Khetri
Rutlam	Rewa	Bagh
Dewas (Senior Branch)	Jaipur	Jhabua
Sitamau	Bundi	Chhatarpur
Narsingarh	Partabgarh	Sikar and Karauli

Madhya Pradesh

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Board of Governors has withdrawn from membership

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Those who are familiar with its record of discovery and application of solutions to
the agricultural problems of its member States will testify that the Institute has fully
justified its existence Its members in the past have profited much from the heavy
capital outlay and the share of overhead expenses borne by the Indian Central Cotton
Committee It seems probable that circumstances will force that body to reduce its grants
still further in the near future and therefore if serious reductions in the Institute's efficiency
are to be avoided a much larger measure of financial support must be given by States.

3 *Staff and Students*—The Geneticist and Botanist was absent on leave and deputation in Europe from 13th July to 6th October 1935, when he led the Government of India delegation to the Imperial Botanical Conference in August and was a member of the delegation to the Sixth International Botanical Congress in Amsterdam in September.

As a result of this absence and of a temporary reduction in staff in the Genetics and Botany Section for two months during the busiest season of the year, the preparation of papers for publication has not been as rapid as it would otherwise have been.

Geneticist	1
Botanist	1
Research Assistant	1
Junior Farm Assistant	1

Two posts of Junior Farm Assistant were abolished, and two of Research Assistant in the Chemistry and Agronomy Section remain vacant for lack of funds, in addition to others.

The uncertainty as to their future which unfortunately prevails in the minds of a number of the research workers in the Institute is not conducive to that steady application and calm atmosphere so essential for good work on intricate problems. What has been done by these workers is therefore all the more creditable.

The personnel of all Sections have worked with a vigour and enthusiasm which is most praiseworthy and which is due, in no small measure to their realization of, and pride in the fact that they are building up an organization which in many ways is unique in India, and which is commanding in an increasing degree the respect and attention of those of much older standing.

That numerous requests are received from highly qualified scientific workers both in India and abroad, to be allowed facilities at the Institute to carry out research work on a voluntary basis is a proof of the Institute's rising reputation. Most of these requests had to be refused, owing to limitations in accommodation and equipment but five such workers have been entertained during the year.

4 *Visitors*—The Institute received the honour of visits by His Highness the Maharaja Scindia of Gwalior, who devoted several hours to a thorough examination of the work in progress, and Their Highnesses the Maharajah of Dewas (J B) and the Raja of Sailana.

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Among other visitors during the year were the following —

Salim B. M. B. C. — Y. C. G. B. B. B.

New Delhi
London

Indore

unistration,

Barwani

Hiralal K Seth, Rai Bahadur, Rajya Bhushan, Managing Director, Rajkumar Mills Ltd, Indore

Hulkoti R Y, Acting Professor of Agriculture Poona with a party of 53 students
Jasol, Kunwar Amar Singh of, Director of Agriculture and Grass Farms Jodhpur
Rajputana

Kanungo, S V, Finance Minister, Holkar State Indore

Kesarisingh, Chief Member of Council, Kishangarh, Rajputana

Kibo, M V, Sardar, Indore

Nadkarni, M M, Manager, Sajjan Mills, Rutlam

ral

Yelwande, R. C., Revenue Minister, Dewas (J. B.)

5 *Library*—Accessions during the year were—

Text books and works of reference	41
Complete volumes of journals	140
Reports, bulletins, etc	247

Eight new books have been added to the list of named collections.

RESEARCH WORK.

3. *Genetics*—During the last few years an important step has been taken in the

This has been done in spite of the fact that the head of the Genetics and Botany Section could not be recruited until the end of August 1933, and of the financial uncertainty in the last two years, which has led to the loss of research staff on whose special training much time and care had been spent.

The revision in research policy introduced in 1932 has borne fruit abundantly. The research staff take great pains to keep abreast of the results of other workers in their subjects, and for this the abstract publications of the Imperial Agricultural Bureaux have been invaluable.

The fullest use is made of modern methods of experimentation and particular mention may be made of the applications of mathematics to the design of field and laboratory experiments, and to the statistical treatment of their results, which probably have been more thoroughly and extensively exploited at the Institute than by any other research organization in India. The statement below shows the extent to which, in field experiments alone, such methods have been utilized.

Randomized, replicated field Experiments

	1932	1933	1934	1935	1936 (kharif)
At Indore	24	82	43	35	56
In States	33	87	142	178	95

The precision and rapidity with which results can be interpreted amply repay the extra trouble involved.

Statistical methods have also been applied with outstanding success to plant breeding problems and the new technique evolved enables degrees of superiority or inferiority to be recognised with accuracy several years sooner than has hitherto been possible. In the laboratory too the degree of accuracy of measurements and analyses can also be determined by similar methods which are in regular use at Indore though not commonly elsewhere.

The willing co-operation of the States and their officers in carrying out field trials sponsored by the Institute remains a feature worthy of much commendation. Owing to this many items are now ripe for propaganda by them.

The Institute is once again indebted to the Provincial Departments of Agriculture in India for many courtesies and much assistance and it is pleasing to be able to record that repayment in kind becomes increasingly possible. These remarks also apply to Agricultural Departments in the U S A the French Colonies Russia Iran and many parts of the Empire.

7 *Weather and its effects on Crops*—In Malwa the monsoon rainfall was close to the average of many years the Institute recording 30.8 inches from June to September/34. However the following areas of the Malwa monsoon

	1935	1934	1933
Pre monsoon	1.67	0.10	0.60
June	5.97	10.72	10.09
July	12.78	8.08	14.75
August	4.83	21.17	14.44
September	7.24	15.96	10.35
October	1.52		0.91
November	0.34	1.40	0.19
Total	34.33	57.43	51.33

— In 1934, the rainfall was 57.43 inches, which affected the crops.

There was no frost in Central India save in the northern States bordering Rajputana where also there was no very severe damage to crops.

There were some cases of loss of material from French Africa left certain obscurities in the relationships of the wild and cultivated African types. As it is

solution of the confusion in nomenclature has been referred to a systematic botanist for his opinion. It is hoped that it will be possible to publish in the course of two or three months.

(b) *Botanical Survey*—The work of the Nizar is almost complete. Durum greatly extended. In connection

tours were undertaken at the times of harvest of the two types of cotton now under cultivation, Matheo and Wagad. The present status and botanical composition of the two crops was elucidated, and selections were made in both. It was established that (1) The range of variation in Wagad is very much greater than in Matheo. This was predicted

arise by hybridisation of primitive or *divergent* types such as *Arborescens*

Investigations into the possibilities of substituting medium for short staple *desi* varieties of cotton have yielded valuable results. The study of old literature has shown that *desi* cottons which would now be classed as medium or long staple were formerly grown in the Nerbudda valley and in parts of Rajputana, two areas which are now contributing largely to the embarrassing bulk of India's short staple crop. The invasion of

the *desi* cottons of the Nerbudda valley in Wagad and do not give their crop before the *desi* cottons which would now be classed as medium or long staple were formerly grown in the Nerbudda valley and in parts of Rajputana, two areas which are now contributing largely to the embarrassing bulk of India's short staple crop. The invasion of

* Financed by the Indian Central Cotton Committee for the study at Srirangapatna (North Bikaner) of *neglectum* cottons of possible utility for the improvement of the coarse cottons of the Bengal tract.

(c) *Genetics*—(i) Further confirmation of Hutchinson's theory of the organization of the gene has been provided by the discovery of at least one more allelomorph in the leaf shape series

(ii) Studies on the fundamental genetic basis of the lint hairs are being carried on and either four or five genes for "lintless" are now known

lamina between veinlets

(iv) The work of interspecific hybridization with *G. anomalum* recorded under "Cytology" in the last report has developed chiefly on the genetic side. The second back crosses were very successful, combining great vigour, and a desirable plant habit, with lint of reasonable length and fineness and a fair ginning percentage. Considering the

(v) From the study of genetic variance in parents, F1's and F2's of all possible crosses between three strains of *G. arboreum* var. *neglectum* data of great interest are now available. The preliminary stages of the analysis have demonstrated the existence of hybrid vigour even in intervarietal crosses and the existence of genetic variance in strains which have been selfed for as much as seven generations. The replicated progeny row technique developed last year has made possible the elimination of a number of disturbing factors which would have vitiated the experiment if laid out on any of the systems in common use for such purposes.

(d) *Selection, Breeding and Seed Distribution—Malwa Tract*—Plant breeding work has been closely linked with the study of genetic variance referred to above. The principle of basing selection on variance as well as mean value has proved its worth, and the advantage of the replicated progeny row technique over current plant breeding methods becomes greater as time goes on. Abundant information is now available for compiling papers on the replicated progeny row technique and on the results so far achieved from it.

(i) The first achievement of the new technique has been the isolation of five sub strains from Malvi 9 which differ considerably in their morphological characters. Two of the sub strains surpass both Malvi 1 and Malvi 9, considerably in earliness. Spinning

tests on them and on Malvi 9 bulk show marked differences between them. They were valued as fit for the following highest standard warp counts

Strain	H S W C
MI9 bulk	16 s
MI9 13	20 s
MI9 15	15 s
MI9 17	22 s
MI9 19	13 s
MI9 20	21 s

The isolation of sub strains up to 37 per cent better in spinning value from a strain which according to any current plant breeding standard would have been considered pure must be regarded as a considerable advance.

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(ii) A mill test on a full bale of Malvi 9 bulk was arranged by the Director of the Technological Laboratory, Matunga and carried out by the Bombay Dyeing and Manufacturing Co., Ltd. In nominal 20 s counts it gave a test of 63 lbs, and the cotton was valued at Rs 40 on Broach.

Trade opinion is unanimous that Malvi 9 represents a great advance in quality over the Malvi 9 bulk.

improvements in quality the maximum premium obtainable is about 15 per cent and the main emphasis therefore remains on increased yield rather than on increased quality.

(iii) The examination of the new Malvi selections has shown that few of them attain the same high standard of quality as Malvi 9.

(iv) The examination of the new Malvi selections has shown that few of them attain the same high standard of quality as Malvi 9.

(v) The Dhar mass selected Malvi strain and the first seven progenies selected from it have already been tested against Malvi 9 in a full size experiment. Yield was as high as Malvi 9 but staple length and ginning per cent were somewhat lower. This first batch has therefore been discarded in favour of the next batch coming for test some of which have considerably better lint properties. Among them also, are strains with greater monopodial development than is usual in Malvi cotton. On theoretical grounds it is considered that such a habit may be of value in delaying flowering until after the risk of

late rains and then getting flowering over in a sufficiently short period to ensure the ripening of the crop before the danger of damage from frost. The production will be checked by flowering and cropping records in the current season.

The Dhar Mahi material will be grown in parallel cultures at Indore and Dhar in the current season and comparisons will be made between the genetic variances of new selections from the 11 lines selected material from Dhar and low-selected Mahi 2. The fundamental importance to plant breeders of information concerning the effect of selection on genetic variance is obvious.

(iii) The transfer of work on Mahi Upland (American) to Radnagar (Dhar State) reflected in last year's report has already resulted in substantial progress. A single growing considerably higher yield than the best has been isolated, and further promising early maturing and high quality types are being tested in the current season.

(iv) From the Nimar selection the new batch has now been taken for full scale test. The good quality types are all of the "yellow flowered, broad leaf" constitution which has a much higher average yield than the very best types in the Central India section of the Horticultural Survey. This is a sun type has been a real one on account of its wide resistance. A number of selections are now available with satisfactory sample length and "feet".

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(v) The continuation of the breeding work at Dhar, and Radnagar, and in Nimar has resulted in the selection of several types which are to be tested from Indore with the cooperation of the Department of Agriculture and two Agricultural Officers of Dhar State, and of a private seed grower. The investigation carried out in two seasons is a continuing study of the effects of selection on the yield of a sun type plant breeding work on modern lines and the selection of early maturing types and is available and laboratory facilities depend on it.

(vi) The selection of the best types from the Dhar, and Radnagar, and in Nimar has resulted in the selection of several types which are to be tested from Indore with the cooperation of the Department of Agriculture and two Agricultural Officers of Dhar State, and of a private seed grower. The investigation carried out in two seasons is a continuing study of the effects of selection on the yield of a sun type plant breeding work on modern lines and the selection of early maturing types and is available and laboratory facilities depend on it.

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In 1942 the selection of the best types from the Dhar, and Radnagar, and in Nimar has resulted in the selection of several types which are to be tested from Indore with the cooperation of the Department of Agriculture and two Agricultural Officers of Dhar State, and of a private seed grower. The investigation carried out in two seasons is a continuing study of the effects of selection on the yield of a sun type plant breeding work on modern lines and the selection of early maturing types and is available and laboratory facilities depend on it.

The only trial in the Dhar selection of Mahi 2 was carried out from late sowing and all varieties of the trial to have a substantially lower yield than best.

The main important trials in Mahi 2 were carried out at four centers for comparison of Mahi 2, Dhar (Indore) and that Mahi 2 is as possible as the

July

It was carried out at four centers for comparison of Mahi 2, Dhar (Indore) and that Mahi 2 is as possible as the

It is now safe to conclude one was favorable for the

late rains and then getting flowering over in a sufficiently short period to ensure the ripening of the crop before the danger of damage from frost. The prediction will be checked by flowering and cropping records in the current season.

The Dhar Malvi material will be grown in parallel cultures at Indore and Dhar in the current season and comparison will be made between the genetic variances of new selections from the field, mass selected material from Dhar and line selected Malvi 9. The fundamental importance to plant breeders of information concerning the effect of selection on genetic variance is obvious.

(vi) The transfer of work on Malwa Upland (American) to Badnawar (Dhar State), referred to in last year's report has already resulted in substantial progress. A strain giving considerably higher yield than the bulk has been isolated and further promising early strains and high quality types are being tested in the current season.

Full scale test
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reason to believe that a satisfactory value can be attained without going outside the material now in hand.

do not exist

(c) *Variety Trials*—Cawnpore 520 and Mollisoni were compared in randomised block trials in 1935 at the State Farm at Sriganganagar and in cultivators' fields both in the light soil and on the stronger Ghaggar bed soils at six centres in the Gang Canal Colony (Bikaner State). Yields were poor. Cawnpore 520 did not differ significantly from Mollisoni except in the light soil where the latter yielded significantly better. Cawnpore 520 obtained a premium of about eight annas per maund of *Lapas* over Mollisoni at all centres. At the State Farm eight desi strains from Lyallpur were compared with Cawnpore 520 and Mollisoni. All these strains are of poor quality like Mollisoni and out of them only two Rossum 10 and Mollisoni 74, have been retained for further trial on account of their good yield and high ginning percentage.

In Jaipur State trials were carried out at three centres. Due to late sowing yields were poor. Cawnpore 520 on the whole did better than the other varieties tried.

In the black soil area of Jodhpur State trials were conducted at three centres. This is the only tract so far studied where an Upland variety appears to be more profitable than desi types. On the basis of results obtained so far, a trial distribution of Indore 1, a selection from Malwa Upland, has been recommended.

The only trial in the black soil area of Bundi State suffered from late sowing and all varieties except Indore 1 gave a significantly lower yield than local.

The most important trials in Malwa were those carried out at four centres for comparison of Malvi 9, Dhar Cambodia and local on *othan** land. It is now safe to conclude that Malvi 9 is as profitable as Upland cotton under conditions most favourable for the

* Irrigated and manured for many years.

latter, while Malvi 9 is more profitable under all other conditions. At Chhabra in Tonk State Malvi 9 yielded as well as the local cotton and had a better staple and a considerably better ginning percentage.

In Nimar replicated trials were carried out at Khargone, Sendhwa, Kannod and

(f) *Physiology*—(s) A botanical analysis of the published data on spinning quality and hair characters has been made and the findings are being put together for publication. Varieties 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.

(ii) Arising out of the cotton census, physiological experiments were carried out in the hope of discovering the main factors responsible for the observed differences in survival value of the four simple geno types. Monthly changes in leaf area and dry weight were determined and it was shown that while leaf shape affects very greatly the

(iii) Experiments on the effect of competition on the relative survival value of
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(a) *Leaf roll and Red leaf of*
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 manured *adhan* soils of this
 The disease however appears
 the irrigated arid soils of the
 hile the crop is maturing but
 rvations in the year 1934 35

Given below

TABLE 1.—Yield Differences in Healthy and Diseased Plants—1934 35

Variety P 289F, at Singanganagar, Bikaner State. Mean yield of laps (seed cotton) in grammes per plant from 30 random pairs

CONDITION	First picking	Second picking	Third picking
Healthy	77 67	364 00	323 33
Diseased	411 33	209 67	97 67

	P	Sig differences
Health and disease	> 0 05	
Pickings	< 0 05	5 22
Interaction Health disease x pickings	< 0 01	5 63

Total yield of *kapas* was not affected. Most of the yield of diseased plants was

about 19 millimetres only

(ii) *Chemical Differences in the Composition of Mature Leaves of the Healthy and Diseased Plants*—The pH values of the water extracted sap of the healthy, green Cambodia leaves were significantly higher than those of both the green and red portions of the diseased leaf. There was no difference between the sap of green and red portions of the same leaf.

TABLE 2—pH Values of the Sap of Healthy and Diseased Leaves of Cambodia Cotton at Indore

COMPARISON BETWEEN	Mean pH		n	t	P
	Healthy	Diseased			
1 Healthy green (whole leaves) and rolled green portions of leaves	5.82	5.69	12	2.34	<0.05
2 Healthy green (whole leaves) and red portions of leaves	5.82	5.61	12	3.63	<0.01
3 Green and red portions of rolled leaves	5.69	5.61	14	2.06	>0.05

The concentration of the sap—as indicated by osmotic pressure measurements—of healthy leaves was higher than that of unhealthy ones.

TABLE 3—Mean Osmotic Pressures (Atmospheres) of leaf sap of Healthy and Diseased (leaf roll) Cambodia cotton plants

Healthy	Diseased	n	t	P
6.7	5.2	120	6.87	<0.01

These observations indicated that the sap of diseased leaves was poorer in soluble matter—apparently in basic materials. This was borne out by actual analysis of samples of healthy and diseased mature leaves collected at Indore and Jaipur, boiled immediately and preserved in 90 per cent alcohol. The outstanding differences in the composition are given below—

TABLE 4—Composition of Healthy and Diseased mature leaves of Cambodia On Oven dry Basis.

DESCRIPTION	Mean per cent		P	Significant difference
	Healthy	Diseased		
Nitrogen	1.71	1.21	<0.05	0.39
K ₂ O + MgO/P ₂ O ₅	4.83	3.99	<0.05	0.73

(iii) *Root Activity*—These differences indicated the inability of the diseased plant to maintain balanced metabolism. A comparison of the root activity of adjacent pairs of healthy and diseased plants revealed the following differences—

TABLE 5.—Differences in Root-activity of Healthy and Diseased Cambodia Cotton Plants at Indore

—	Soil depth	Mean root length in inches		n	t	P
		Healthy	Diseased			
Active roots	12" downwards.	40.5	6.1	20	3.67	<0.01
Dead roots	0-12"	4.8	15.7	20	3.18	<0.01

The active root-length of diseased plants below one foot depth was significantly less and the length of dead roots was significantly greater in the upper foot for the diseased plants than the healthy ones. It appears that the extensive root death in the upper zone reduces the activity of the roots in the lower zone in diseased plants.

(iv) *Soil Condition*—The concentrations of soil water from zones around healthy and diseased plants also showed the following interesting differences—

TABLE 6.—Mean Osmotic Pressures (Atmospheres) of Soil-water from Zones around Healthy and Diseased Cambodia Cotton Plants

DESCRIPTION		Healthy	Diseased	n	t	P
1	Upper zone 0" 3"	3.59	13.37	10	4.94	<0.01
2	Lower zone 12" 15"	10.37	17.22	10	3.43	<0.01
3	Percentage drop from lower to upper zone	62.86	22.31	10	3.84	<0.01

Osmotic pressures of soil water were less around roots of healthy plants than diseased. The percentage fall in osmotic pressure was significantly higher in diseased plants than in healthy plants.

(b) *Wilt*—(i) *Periodicity*—Observations taken during the years 1933-34 and 1934-35 on the periodic fluctuations in virulence of cotton wilt (*fusarium* sp.) have now been completed. The results calculated on initial stand for each period are given. Table 7. Numbers significantly higher than both are marked with a double dagger (‡) and those with a single dagger (†) pointing one way.

TABLE 7.—Periodic Fluctuations in Wiltng

Percentage of deaths on initial stand at the beginning of each period

A *Malva*

PERIODS	F No 19 1933 34	F No 11B 1933 34	F No 19 1934 35	F No 11C 1934 35	F No 11B Seed from diseased plants 1934 35	F No 11B Seed from healthy plants 1934 35
1st	0	7 8	10 6	13 7	0	0 4
2nd	4 1	5 0	†21 0	†25 1	21 3	15 3†
3rd	9 2	†17 5	†27 7	10 2	16 3	14 3
4th	7 6	4 6	†45 0	7 3	26 1	27 3†
5th	1 0	†15 6	14 9	7 8	26 5	18 6†
6th	6 9	†8 5	16 1	11 7	5 3	7 5
7th	0	1 9	19 1		21 5	25 2†
8th	5 1	2 7			9 2	5 0
9th	3 7	0			19 7	10 3
10th	2 3	0			5 5	8 4
11th	3 3	†6 9			5 3	5 2
12th	1 5	†11 2				
13th		†27 0				
P	> 0 05	< 0 01	< 0 01	< 0 01	> 0 05	< 0 05
Sig Diff		3 5	6 4	6 4		9 1

B *Verum*

PERIODS	F No 10 1933-34	F No 11B 1933 34	F No 19 1934 35	F No 11C 1934 35	F No 11B 1934 35
1st	0	1 3	7 3	12 2	0 4
2nd	0 8	3 9	9 1	†21 8	8 1
3rd	2 5	8 1	†18 1	†5 8	6 3
4th	0	5 2	†14 0	0 6	†16 3
5th	3 2†	0	†7 5	1 7	9 3
6th	1 0	0 7	0 5	4 2	2 1
7th	0	0	2 0		5 0
8th	0	3 8	†10 7		1 8
9th	0	0			3 7
10th	1 0	0			1 3
11th	0	0			2 0
12th	4 4†	0			
13th		2 9			
P	< 0 05	> 0 05	< 0 01	< 0 01	< 0 01
Sig Diff	2 7		3 8	4 3	6 6

C Roseum.

PERIODS	F No 19 1933 34	F No 11B 1933 34	F No 19 1934 35	F No 11C 1934 35
1st	0	9 8	†10 9	10 9
2nd	5 6	17 7	5 7	†11 2
3rd	3 4	17 6	†19 5	†5 1
4th	3 0	7 6	†18 5	0 6
5th	0	18 8	2 4	3 7
6th	0	12 0	†7 5	3 6
7th	0	0 9	5 2	
8th	1 3	2 6	8 1	
9th	1 2	0		
10th	0	2 2		
11th	0	0		
12th	0	6 4		
13th	0	0		
P	> 0 05	< 0 01	< 0 01	< 0 01
Sig Diff		12 6	4 6	3 4

D Dhammar 2

PERIODS	F No 19 1933 34	F No 11B 1933 34	F No 19 1934 35	F No 11C 1934 35
1st	0	5 6	†10 0	4 1
2nd	1 7	9 2	4 7	3 6
3rd	2 4	†13 5	†15 3	2 9
4th	1 6	4 3	†16 9	0 8
5th	2 2	7 1	5 4	0 4
6th	0	3 3	5 8	1 1
7th	0	2 4	2 9	
8th	0 4	1 0	3 8	
9th	0 8	1 0		
10th	0	1 1		
11th		0		
12th		0		
13th		1 3		
P	> 0 05	< 0 05	< 0 01	< 0 05
Sig Diff		7 5	4 1	2 5

E Dharwar I

PERIODS	F No 19 1933 34	F No 11B 1933 34	F No 19 1934 35	F No 11C 1934 35
1st	0	10 8	11 6	7 1
2nd	†9 1	15 8	10 3	†11 8
3rd	11 3	†18 6	†21 6	2 1
4th	5 0	6 6	†23 6	1 9
5th	0 6	4 6	8 7	0 6
6th	0 2	5 1	7 2	0 3
7th	0	7 0	6 3	
8th	0 6	1 5	7 1	
9th	2 3	0		
10th	0 6	3 0		
11th	0	0		
12th	0 2	1 3		
13th		0 7		
P	<0 01	<0 01	<0 01	<0 01
Sig Diff	6 8	7 5	6 1	4 1

It may be noted that (1) per cent fluctuations in death rate may not vary significantly

Irrespective of season and field Dharwar 1 showed a greater susceptibility than Dharwar 2 but there was no such difference between Verum and Roseum

TABLE 8—Mean percentage deaths due to wilt of resistant and susceptible varieties grown at Indore irrespective of field and season

	Resistant	Susceptible	Resistant	Susceptible
	Verum	Roseum	Dharwar 2	Dharwar 1
Mean % deaths	4 8	6 1	3 7	6 1
	P>0 05		P<0 01,	Sg Diff 1 8

Thus it appears that a variety which is resistant to wilt is not only under certain conditions but may become susceptible under certain conditions. The variety may become susceptible in a particular season at Indore was for example 4 per cent for Roseum 51 per cent, for Dharwar 2 50 4 per cent for Verum 31 1 per cent for Dharwar 1 and 20 6 per cent for Dharwar 2

in the period
at 15 inches
This agrees

Within this period a sudden rise in death percentage seems to coincide with the sudden rise in mean duration of sunlight at the end of the monsoon, which rose from two hours to five hours daily

In the later period, when the soil temperatures were low duration of sunlight made no difference

(iii) *Nutrition and soil texture—Pot cultures*—In one series of pot cultures in 1934 the soil was mixed with heated soil (at the rate of 60 cartloads per acre/two inches), ferrous sulphate (at the rate of 5 cwts. per acre/two inches) and slaked lime (at the rate of one

TABLE 9—Physical treatments, manuring of soil and wilt incidence in pot cultures
Mean death percentage

MANURES	Physical Treatments.		
	Ferrous Sulphate	Fire heated Soil	Slaked Lime
Nicifos	28.6	11.1	21.1
Ammonium sulphate	26.9	47.8	29.2
Farm compost	23.6	16.7	0
Municipal compost	6.7	25.0	8.3
	P	Sig	Diff
Physical treatments	> 0.05		—
Manures†	< 0.05	16.2	—
Interaction (physical treatments x manures)	> 0.05		—
†Ammonium sulphate	Nicifos 22/18	Farm compost	Municipal compost
34.6	20.3	13.4	13.3

Nitrogenous treatments increased incidence as reported before (1935), in spite of textural treatments. It is to be noted that the presence of phosphorous (Nicifos) had slightly modified the influence of nitrogen

Field tests—The uniform intensity of treatment in the subsoil plays its part in 1934 and manuring treatment from healthy and plants was sown the following table

TABLE 10—Significance

	VERUM.		MALVI		MALVI DISEASED SEED	
	P	Sig Diff	P	Sig Diff	P	Sig Diff
Periods	<0 05	2 95	<0 05	4 28	<0 05	6 50
Manures	<0 05	1 07	<0 05	1 39	<0 05	1 73
Manures X physical treatments	<0 05	3 32	>0 05		<0 05	4 67
Manures X periods	<0 05	3 20	<0 05	4 2	<0 05	5 12
Manures X physical treatments X periods	<0 05	8 75	<0 05	11 61	<0 05	13 96
Physical treatments	>0 05		>0 05		>0 05	
Physical treatments X periods	>0 05		>0 05		>0 05	

between farm and municipal compost. The physical treatments in general made no difference but influenced the behaviour of manures with Verum and Malvi from diseased seed. For all varieties however manures influenced the periodic fluctuations and the physical dressing modified that influence.

It is thus clear that under field conditions application of the same manures may give varying results due to their interaction with the soil conditions and variety grown.

variety grown estimated independently

(i) *Leaf Composition in wilted and healthy plants*—Mature leaves of the resistant Verum and susceptible Malvi plants—healthy and on the point of wilting—were collected, dried in 85 per cent. alcohol and analysed.

A few significant differences in composition are tabulated below.—

TABLE 11.—Composition of mature leaves of healthy and wilted plants.

Mean percentages on oven dry basis

Description.	Varieties and Conditions.						Significance.			
	Malvi.		Verum.		Varieties		Conditions.		Varieties and Conditions	
	Healthy	Wilted.	Healthy	Wilted.	P	Sig diff	P	Sig diff	P	Sig diff
Nitrogen	2.36	1.87	2.30	1.65	<0.05		>0.01	0.47	>0.05	
Phosphate (P_2O_5)	0.70	0.55	0.93	0.80	<0.05	0.23	>0.05		>0.05	
Magnesia (MgO)	1.93	0.12	0.91	0.81	>0.05		<0.01	0.66	<0.01	0.93
Ratios										
Magnesia/Nitrogen	0.80	0.08	0.39	0.54	>0.05		>0.05		>0.05	0.71
Magnesia/Potash	1.06	0.12	4.05	0.65	>0.05		>0.05		>0.05	0.80
Lime/Potash	0.81	1.64	0.60	1.15	>0.05		<0.05	0.63	<0.05	0.93
Magnesia/Lime	1.54	0.09	0.82	0.71	>0.05		<0.05	0.66	<0.05	0.93
MgO										
$N+P_2O_5$	0.61	0.09	0.28	0.36	>0.05		>0.05		<0.05	0.34
K_2O+MgO										
$N+P_2O_5$	1.26	0.75	0.91	0.94	>0.05		<0.05	0.21	<0.05	0.29

The higher phosphate content of the resistant variety, Verum, than that of the susceptible Malvi is significant. The lower ratio of Malvi, as regards phosphate content

(c) Nutrition in relation to environment—yield (1) 'Soil variety' humus and nutrients—Pot cultures—Three years' experiments have clearly shown that the nutrition of the cotton plant

Nicifos.

It became evident that pot-culture studies would be more serviceable to field practice if they included consideration of the possible influences on plant nutrition of the varying conditions existing between fields in the same soil type. The investigation in replicated pot cultures of the effect of differences in field soils was first taken up in 1935-36. Soils were collected from the medium and heavy soils of the district. The medium soil is scarce and the heavy soil is subject

inches for the medium one. The manurial treatments were compost alone Nicifos 22/18 (N P=1) soils and bot grown and

etained for subsequent
only on rains. The

TABLE 12 — ' Soil varieties ' manures and cotton varieties

Total yields of *lapas* per plant

A Pot cultures—gms per plant

VARIETY OF COTTON	Soil Variety	Horizon	No Manure	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Cambodia—	Rich	1	2 7	17 3	13 2	8 3
		2	3 3	7 4	4 8	7 4
	Medium	1	7 1	5 8	6 5	5 6
Indore 1		2	5 5	24 1	8 8	76 0
	Poor	1	2 6	5 6	14 1	14 2
		2	4 9	10 5	11 9	14 5
Malvi 9	Rich	1	0 0	3 1	4 5	3 0
		2	0 8	5 2	13 5	3 3
	Medium	1	6 4	18 4	12 9	7 9
		2	4 4	4 4	19 6	32 7
	Poor	1	0 0	7 0	18 6	37 9
		2	0 6	16 7	8 4	31 3

Significances.

P

Sig Diff

Soil "varieties"	<0 05	5 8
With or without compost	<0 01	7 8
With or without Nicifos 22/18	<0 01	7 8
Soil ' varieties ' × horizons	<0 00	8 3
Soil "varieties" × horizons × with or without Nicifos 22/18	$\left\{ \begin{array}{l} \text{Nearly sig on } 5\% \\ \text{Z value } 0.5723, \\ \text{required } 0.5951 \end{array} \right\}$	14 2

All other differences are non significant

B

Compost	No Compost
15 3	7 3

C.

Горизонт.	Soil "variety "		
	Rich	Medium	Poor
1	6 5	8 9	12 5
2	5 7	22 0	12.4

D

HORIZON	Nicifos 22/18			No Nicifos		
	Soil "variety "					
	Rich	Medium	Poor	Rich	Medium	Poor.
1	7 3	8 3	21 2	5 8	9 5	3 8
2	7 3	34 3	16 6	4 2	9 7	8 2

Comy
plants wa
"varieties
significan

the yield from the second horizon of

investigation. At any rate these results partly explain why those of pot-cultures in 1934 were not always reproduced in the field. The consistent superiority of compost found when applied to different soils and horizons in this test has so far failed to appear in the field. Perhaps this may be due to the difference in the depth of application. Similar superiority was noted last year for a small field plot when the manure was applied deep.

The Cambodia plants retained their stand in all the pots but that of Malvi was reduced due to casualties by wilting. A statistical examination brought out some interesting results which are given below —

TABLE 13 — *Stand for Malvi cotton*

Mean of 4 pots.

TREATMENT	Soil "variety"		
	Rich	Medium.	Poor
No manure	0.7	1.5	0.2
Compost	1.2	1.0	2.0
Nicofos 22/18	1.5	1.2	1.5
Compost and Nicofos 22/18	0.7	1.5	1.7

Almost significant $Z=0.5806$

Z required = 0.5951 Sig. diff. = 0.74

The unmanured rich and poor soils showed most casualties. Both compost and Nicofos 22/18 showed a marked improvement in the stand, especially in the poor soil.

The differences observed in stand due to treatment in pots suggested an examination

these conditions using in the same pot known thicknesses of two horizons under test, one above the other. This is being done in the current year.

(ii) "Soil variety," humus and nutrients—*field crops*—The favourable influence of nitrogen and phosphate on the yield of Cambodia cotton observed in pot cultures in 1934-35 could not as reported before be obtained in the field either at Dhar (Malwa) or Jaipur in experiments of the same year. The superiority of cake manure over other manures is especially marked in the field.

adequate supply of organic nitrogen and phosphate in local soils while the Cambodia cotton was growing so that reasonably high yields could be obtained as a rule. Two randomised blocks per field were designed for the following places —

(a) *In Pajpura—*

- (1) in Jodhpur and Khetri two fields each,
- (2) in Alwar Jaipur and Bundi one field each

(b) *In Malwa—*

- (1) in Dhar and Jaora one field each
- (2) in Indore two fields.

The treatments were well rotted sheep or cattle dung manure applied at 20 cartloads per acre at sowing with or without a basal dressing of superphosphate, and preceded by a period of fallow or of cultivation. The results are given in Table 14 for the places mentioned above.

TABLE 14—*Yields of rain sown Cambodia Cotton with Sheep or Cattle-dung manure*

Total yields of laps in lbs per acre

BASAL DRESSING	Top Dressing	Jodhpur		Jaipur	Bundi	Alwar	Khetri Mirapur	Indore I P I
		Bali	Mandore					
Cow-dung	None	1 467	1 195	949	677	465	554	303
	Cow dung	1 488	1 312	966	701	605	445	357
Sheep dung	None	1 558	1 236	959	674	765	533	230
	Sheep dung	1 406	1 261	1 140	711	541	406	365

Significances :

P

Sig diff

Places
Basal dressings
Top dressings
All interactions

< 0.05
> 0.05
> 0.05
> 0.05
274.4

PLACES

Jodhpur Bali	Jodhpur Mandore	Jaipur	Bundi	Alwar	Khetri Mirapur	Indore I P I
1 480	1 251	1 003	691	594	454	315

The yields at Jodhpur and Jaipur were much higher than expected for a rain sown crop, and reached the level of those from hot weather sown crops at the same places in previous years while those at Bundi, Alwar and Khetri were at least equivalent to those usually obtained there with local cotton. These results seem to be significant and are being followed up. The variation of yield from region to region is interesting.

(d) *Nutrition in Relation to Environment—Quality*—Observations on staple-length of the pooled pickings of both Cambodia (Indore 1) and Malvi 9 from the pot culture test of last year have now been statistically examined. The results are tabulated below—

TABLE 15—Soil Texture, Nutrition and Staple Length of Cotton

(A) Mean Staple Length in mm

TREATMENTS	CAMBODIA—INDORE 1				MALVI 9			
	No treat-ment	Com post	Acid	Com post + acid	No treat-ment	Com post	Acid	Com post + acid
None	23.3	22.0	22.6	21.3	24.2	21.5	22.8	22.2
N	22.2	23.0	21.8	24.6	24.0	20.6	23.5	24.0
P	19.7	23.4	22.1	24.9	20.0	20.3	20.8	21.5
K	21.9	23.7	22.5	22.1	21.6	19.6	24.0	21.9
NP	17.6	21.5	21.1	22.6	21.0	20.8	23.5	21.5
NK	20.0	22.2	24.4	19.2	19.4	21.1	20.7	20.5

(B) SIGNIFICANCES

FACTORS	P	Sig diff	Interac- tion of first order	P	Sig diff	Interac- tion of higher order	P	Sig diff
a Varieties	<0.05			<0.01	0.76		<0.01	0.82
b Texture treatments	<0.01	0.53	$\begin{cases} a \times b \\ c \times a \\ d \times c \end{cases}$	$\begin{cases} <0.05 \\ <0.01 \end{cases}$	$\begin{cases} 0.52 \\ 0.57 \end{cases}$	$\begin{cases} d \times c \times a \\ d \times c \times b \\ d \times b \times a \\ d \times c \times b \times a \end{cases}$	$\begin{cases} <0.01 \\ <0.01 \\ <0.01 \\ <0.01 \end{cases}$	$\begin{cases} 1.16 \\ 1.16 \\ 1.16 \\ 1.58 \end{cases}$
c Presence or absence of nitrogen	<0.05	0.38	$\begin{cases} d \times b \\ d \times a \\ c \times b \end{cases}$	$\begin{cases} <0.01 \\ <0.05 \\ >0.05 \end{cases}$	$\begin{cases} 0.79 \\ 0.58 \end{cases}$			
d Presence or absence of K or P	<0.01	0.38						

According to treatments the mean staple length for Cambodia (Indore 1) varied between 24.9 and 17.5 mm while that of Malvi 9 ranged between 24.5 and 19.4 mm.

It is interesting to note that Malvi 9 without any soil texture treatment was the maximum staple length as lower than its own maximum staple length for treatments (compost + potash) maximum.

It may be pointed out that the untreated pots were filled with a loam of a different nature from that used in the treated pots. The influence of subsoil

The probable cause of the present under the maximum supply of differences in soil fertility appears to be both due to the supply of supply obtaining in the experiment

The results of the m of ne su it activities in the soil

Thus, perhaps, explains why different workers came to different conclusions on this subject, some ascribing greater importance to nitrogen, phosphate or a combination of nitrogen and potash, while others emphasized the importance of moisture supply

The results in field experiments reported last year also support this view

(e) *Cotton nutrition in relation to environment plant development* (i) *Vegetative growth and vigour—pot cultures*—In the pot culture test discussed above total dry weights of the aerial portion of the seedlings 41 days old and those of the stems and leaves separately were determined. The bulky tables of the weights and their statistical evaluation are not given here but are reported for greater differences

With Cambodia cifos when used stems but the maximum weights raised by treatment much in their

Nicifos increased the stem weight still more. This can be briefly summarized by the minimum values given below—

TABLE 16—Ratios of minimum to maximum values of dry weights

A. Cambodia Indore 1

RATIOS	No Manure	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Whole shoot	5	14	29	25
Stem	3	8	27	22
Leaf	6	13	29	27

B Malei 9

RATIOS	No Manure	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Whole shoot	5	15	18	23
Stem	6	25	34	42
Leaf	5	11	12	15

The maximum increases in plant weights for Cambodia were obtained on the soil from the first horizon of the medium field and those for Malvi from its second horizon

The ratios of the fresh weights of stems to leaves for each treatment were put to statistical examination. The results are given below —

TABLE 17.—Ratios of fresh weights, stems leaves Indore 1935

A

COTTON VARIETY	Soil variety	Horizon	No treat ment	Compost	Nicifos 22/18	Compost and Nicifos 22/18
Cambodia Indore 1	Rich	1	0 33	0 39	0 59	0 52
		2	0 37	0 42	0 30	0 40
	Medium	1	0 32	0 47	0 58	0 46
		2	0 24	0 44	0 45	0 56
Malvi 9	Poor	1	0 36	0 30	0 33	0 43
		2	0 29	0 31	0 40	0 49
	Rich	1	0 31	0 99	0 31	0 76
		2	0 34	0 37	0 28	0 45
	Medium	1	0 18	0 46	0 38	0 63
		2	0 31	0 26	0 56	0 56
	Poor	1	0 27	0 23	0 21	0 51
		2	0 35	0 24	0 35	0 53

Significances

P

Sig diff

Compost and no compost

<0 01

0 07

B Nicifos 22/18 and no Nicifos

<0 01

0 07

Compost and no compost x cotton varieties

<0 05

0 08

C Compost and no compost x horizons x cotton varieties

<0 05

0 11

The differences due to other factors and interactions are non significant.

B

Nicifos 22/18	No Nicifos
0 46	0 35

COTTON VARIETY	Horizon	Compost	No Compost
Cambodia Indore 1	1	0 43	0 42
	2	0 43	0 34
Malvi 9	1	0 59	0 28
	2	0 40	0 36

(ii) *Vegetative growth and vigour—field crops*—An attempt was made to ascertain the relation, if any between growth and yield of cotton plants from bulk crops in the field in 1935. The free soil moisture around the plants at different depths and stages of growth was also estimated. The observations were taken on healthy vigorous looking plants chosen at random in both a rich and a poor field. Some of them have been examined and are discussed below —

TABLE 18 — *Fresh Weights in grams of Malvi Plants 1935*

Growing Stage				
Stem weight				
Date	Rich field	Poor field	P	Significant difference
16th to 29th August	11 8	6 4	<0 01	2 5
Leaf weight				
24th to 27th August	18 2	9 3	<0 05	3 8
27th to 29th August	21 7	13 0		
Flowering Stage				
Stem weight				
Date.	Rich field.	Poor field	P	Significant difference
25th September to 12th October	56 6	33 8	<0 01	19 8
Leaf weight				
25th September to 12th October	46 8	33 9	<0 03	11 7

ever, were higher in the rich field and were found to be highly and positively correlated with the ratios of stems to leaves at growing stage. The weights of flowers buds and unopened bolls showed a negative correlation with these ratios but it was not significant as indicated in the following table —

TABLE 19—*Correlation between Plant Growth and Yield of Malva Cotton, Indore 1935*

—	A	B	C
FIELD	Total yield of karpas Average per plant in gms.	Average ratio stem leaf per plant Fresh weight—growing stage	Weight of unopened buds bolls and flowers at the boll formation stage in gms
Poor	20.9	0.68	61.9
Rich	32.9	0.82	64.5

(1) r for A and B = +7992 \times , $P > 0.01$

(2) r for A and C = -0.1557 $P < 0.05$

The moisture content of the soils around the plant was also determined in both the fields at all the stages. The results are expressed on air dry basis to get as closely as possible an estimate of free water content. The depths of sampling for each stage were chosen to represent approximately the region where most of the roots were expected to function at that stage. Sampling of soils and plants was done on six days in each period and simultaneously in both fields. During boll formation a third depth was sampled in the rich field only because the other field was not deep enough.

TABLE 20—*Soil Moistures during Cotton Growth Indore—1935*

Mean percentages—Air dry Basis

Soil	Growing stage 16th to 29th August		Flowering stage 25th Sept to 12th October		Boll formation stage 12th to 30th November		
* Variety	3' 6"	9' 12"	3' 6"	12' 15"	6' 9"	12' 15"	18' 21"
Rich	14.3	12.9	14.4	14.4	12.7	12.3	12.5
Poor	17.4	15.8	21.7	20.9	13.2	13.1	

Up to flowering stage the poor field maintained a higher moisture level than the rich one in both horizons. During the growing stage the moisture fluctuated a little the

upper zone being either as moist or moister than the lower zone. The moisture gradually diminished during the flowering stage and was then the same for both horizons. At maturity there was no difference in moisture content either between fields or their horizons.

The differences found in this test between the two fields were in the quantity and nature of plant growth in the early stage and in the content of free water in the soil. Plant growth in the early stage was also moister was equal in their nutrient content for the poor field failed to secure fixation of a lower proportion by a lower yield of *kapas* larger quantity of moisture up to the flowering stage may have some relation to this.

(iii) *Root growth and vigour—field crops*—The differences in root activity observed between healthy and diseased cotton plants suggested similar observations on plants

At maturity the weights of monopodial and sympodial parts were taken as follows

Two months after sowing the pre rains sown plants gave a higher shoot weight than the rains-sown. At second picking i.e. when the maturing stage was coming to an end the superiority in shoot weight still persisted for the Cambodia variety but not for Malvi. Pre rains-sown plants of both varieties gave higher weights of monopodial parts than of sympodial ones.

For the two varieties the total weight and that of the monopodia at maturity were proportionate to the total weight at the age of two months.

TABLE 21—*Correlations (1933)*

Correlations between	r	P
Shoot weight at two months after sowing and —		
(a) Shoot weight at 2nd picking	0.9580	<0.05
(b) Weight of monopodia at 2nd picking	0.9667	<0.05
(c) Weight of sympodia at 2nd picking	0.9021	>0.05

The pre rains sown plants of both the varieties produced more bolls and greater weight of *kapas* than those rains sown.

This was mainly due to the maturing of more bolls and not to heavier ones.

The examination of root lengths yielded the following results —

TABLE 22 — *Influence of age and season on root-development of cotton
(with special reference to activity and death rate)*

(0.9 inches soil horizon.)

	One month after Sowing			Two months after Sowing		At second Picking	
	Date of sowing	Malvi	Cam bodia	Malvi	Cam bodia	Malvi.	Cam bodia
Total root length (inches)	Pre rains Rains	97 150	127 263	191 253	241 327	99 110	164 134
Length of active roots as per cent of total	Pre rains Rains	69 71	69 74	20 31	42 49	5 2	9 6
Length of dead roots as per cent of total	Pre rains Rains	7 8	5 5	53 53	34 35	52 40	44 46

Significances

TREATMENTS	Total Root length		Length of Active Roots as per cent of total		Length of Dead Roots as per cent of total	
	P	Sig diff	P	Sig diff	P	Sig diff
Varieties	<0.01	4	<0.01	6	<0.01	6
Sowing dates	<0.05	34	>0.05		>0.05	
Stages of growth	<0.05	41	<0.05	2	<0.05	6
Varieties and stages of growth	>0.05		<0.05	3	<0.05	8
Sowing dates and stages of growth	<0.05	58	>0.05		>0.05	..

The differences due to other treatments are non significant

Statistically significant differences in root lengths were restricted to the upper 9 inch zone which contained the major portion of the total length

The total root length reached its maximum two months after sowing. It was always greater for the rains sown than for the higher yielding pre rains-sown crop

Percentage length of active roots was highest one month after sowing for both varieties, at both sowing dates while that of dead roots continuously increased with the further growth of Cambodia but with Malvi it reached its maximum two months after sowing and then remained constant

Thus, the differences observed in yield and aerial development between the pre rains sown and rains-sown crops were not paralleled by other properties of the root lengths except the totals for the rains-sown crop at the end of the first and second months from sowing

Differences in availability of moisture cannot account for the greater root length of the rains-sown crops. This seems to be due to different quantities of nutrients for every unit of soil surface tapped. The struggle of the rains sown plants for adequate nutrition seems to be only partially successful and it seems to be more intense one month after sowing than later. Rains-sown Cambodia is presumably more handicapped than Malvi. This is illustrated in the following table

TABLE 23.—Root Development in relation to Plant growth of rains sown and pre rains sown crops

Ratios of values of rains-sown to those of pre rains sown crops

VARIETY	Total Root length		Fresh Weights	
	One month after sowing	Two months after sowing	Whole shoot two months after sowing	Monopodia (at second picking)
Malvi	1 5	1 3	0 6	0 8
Cambodia	2 0	1 4	0 8	0 6

— with a suggestion

as
lea

fully developed unirrigated crop. In 1934, a test on unirrigated with cotton and other crops. The treatments used and results obtained are given below :—

TABLE 24.—Moisture-conserving treatments and yield of Lapas, Jaipur 1934

Lbs per acre				
NO TREATMENT	Compost	Banding and Intercultivation	Banding In tercultivation and Compost	Weeding
358	609	368	460	420

Compost was added at the rate of 5 cartloads per acre

The rainfall for the season was 21.63 inches. There seemed an indication of clean weeding or a light dressing of compost having the desired effect.

In 1935 a repeated experiment was designed to test the immediate and cumulative effect of the following treatments on cotton and other rotational crops—

Main treatments.—

1. No banding
2. Contour banding at 100 ft. distance.
3. Contour banding at 50 ft. distance.

Sub-treatments —

1. No manure.
2. Compost at 5 cartloads per acre.

There were six replications of the experiment. The rainfall was 19.63 inches for the season, the crop suffered from drought in the month of August i.e., during most of its growing stage, and the yields were abnormally low.

The results, however, are interesting.

TABLE 25—*Moisture-conserving treatments and yield of Laxmi Japut 1935.*

Lbs. per acre.

A.

CONTOUR BANDING AT	With Compost.	Without Compost.
100 ft.	90.4	70.0
50 ft.	67.7	71.3
No banding	55.3	29.1

B.

With Compost.	Without Compost	F	Sig. diff.
77.7	33.1	<0.01	29.1

Other differences are not significant.

It is interesting that the results of both years are similar and that a dressing of compost only at five cartloads per acre has given strongly significant differences. The similar effect of a light dressing of compost has been observed in another experiment reported later.

Soil moistures and plant weights at different stages of growth have been taken in this test, which is being continued with slight modifications.

10. *Crops other than cotton*—This has been omitted as it does not deal with cotton.

11. *Statistics and field trial technique*—The statistical work undertaken during the year has been primarily that necessary for the proper design, conduct and analysis of the experiments referred to under other heads. The field technique of progeny row testing has been further developed, in particular by the arrangement of progenies in compact family blocks, in order to deal with problems of increasing importance involving the comparison of variances. Methods of studying the relation between root disease incidence and root morphology have been developed for studies in the genetics of wilt resistance at Indore and root rot resistance at Baroda.

Statistical work in connection with out station variety trials has been continued and a paper on the results of variety testing in Central India and Rajputana has been accepted for publication in "Agriculture and Livestock in India". The technique employed has been developed into a coherent programme from preliminary small growth tests at selected stations to widely distributed trial cum-demonstration blocks on cultivators' fields in which varieties proved satisfactory on State farms are further tested and demonstrated simultaneously under a wide range of conditions under the cultivator's own eye. This programme is the subject of a paper now in preparation.

In the selection used, and that a large amount of genetic variance in commercial characters easily detectable by the replicated progeny row method of breeding had escaped notice during the years when non replicated progeny row breeding was in use.

The statistical work of the section has been extended to parts of India not normally served by the *grass in Baroda*, *are borne fruit*, *our commercial*, *nces the Gene*.

and Botanist spent a week in Cawnpore studying the cotton breeding work in progress there. In his subsequent report he emphasised the need for a closely co-ordinated testing programme embracing all stages of development from the plant breeder to the officers in charge of propaganda and distribution. In collaboration with the Statistical Assistant he drew up a draft experimental programme for the current season which has been adopted by the Director of Agriculture.

The Geneticist and Botanist's visit to Cawnpore facilitated close collaboration between the Economic Botanist on Cotton to the United Provinces Government and the Institute in the *grown in t*, *and Indor*, *Improvem*, *Cawnpore*.

There appears to be a growing interest in statistical methods to breeding problems. In *of the application of*, *for the whole year*, *and two others for a year*, *recently joined, and intends to stay for a year*.

* Financed by a grant from the Indian Central Cotton Committee to the Baroda State Department of Agriculture.
† Financed by a grant from the Indian Central Cotton Committee to the Bikaner State Department of Agriculture.
‡ Financed by a grant from the Indian Central Cotton Committee to the United Provinces Department of Agriculture.

12 *Miscellaneous*—(a) *Scope for manuring of crops*—Several experiments are in progress to compare the utility of green manuring, application of cattle manure or compost or of artificials, singly or together, on cotton, rice, wheat, sugarcane and other crops according to the special requirements of each locality.

(i) *Unirrigated black cotton soil tracts in Malwa*—*Composts*—Immediate and cumulative effect on normal rotation crops. Indefinite and non significant results were obtained from several one season trials comparing the manurial value of composts for unirrigated cotton and groundnut. The response was more definite for jowar and irrigated wheat.

TABLE 46

Response of crops to compost

Lbs. per acre.

A. *Jowar—local Malvi (1933)*

Yield of	Municipal compost	Farm compost	No manure	P	Sig diff
Grain	1,012	900	837	<0.05	105
Kaddi (dry)	7,762	4,812	4,512	<0.05	1,063

B. *Variety—Wheat, Pusa 12, irrigated once (1932)*

Yield of	Compost		Municipal compost		Ammonium sulphate		P	Sig diff
	Nitrogen, lbs		Nitrogen, lbs		Nitrogen, lbs			
	36 72	110 16	36 72	110 16	36 72	110 16		
Grain	1 358	1 874	1,343	1,830	1,063	1,240	<0 05	375
Bhusa	1 564	2,170	1 465	2 216	1,275	1,509	<0 05	528

A long term experiment was therefore set up in 1933 to find out further and to find out

moist soil but it was mixed with the loose surface soil by a bullock when applied to the hard dry soil before rains. The sequence of crops in the rotation was jowar, groundnut, cotton and wheat. Some of the results are given below —

TABLE 47
Efficacy of Compost Manuring on Black Cotton Soil of Medium Fertility at Indore
Yield—lbs. per acre

A.

Crop	1934 35	1935 36	P	Sig diff
Jowar	305	946	<0 01	330
Groundnut	403	984	<0 05	324
Wheat	562	513	>0 05	

B

Crop	Municipal compost		Farm compost		No manure	
	1934 35	1935 36	1934 35	1935 36	1934 35	1935 36
Jowar	310	1 012	320	928	248	848
Groundnut	515	1 062	351	983	252	827
Wheat	601	604	559	469	525	467

Seasons x manures P > 0 05

C

Groundnut (1934 and 1935)

Municipal compost	Farm compost	No manure	P	Sig diff
788	667	555	<0 01	108

D

Groundnut (1934 and 1935)

Time of manuring	Field No 1 with defective drainage		Field No 18 well drained		P	Sig diff
	Municipal compost	Farm compost	Municipal compost	Farm compost		
Before rains	958	823	767	552	} <0 05	134
After rains	849	673	578	622		

E

Wheat (1934 and 1935)

Date of manuring	Field No 1 with defective drainage			Field No 18 well drained			P	Sig diff
	Municipal compost	Farm compost	No manure	Municipal compost	Farm compost	No manure		
Before rains	728	623	589	430	422	404	<0.05	61
After rains	838	805	803	458	471	446	<0.05	127

I

Crop	Municipal compost	Farm compost	No manure	P	Sig diff
Jowar	663	624	548	> 0.05	
Cotton	629	563	527	> 0.05	

Change of season did not affect the influence of the composts on jowar, groundnut and wheat. The results of the cotton crop are available only for one season. Significantly increased yields were obtained only with groundnut and wheat by compost application.

For groundnut municipal compost was superior to farm compost, the application of which also increased yields on both the fields. Municipal compost was superior to farm compost on the field with defective drainage irrespective of date of application. It was so on the well drained field only when applied before rains. Under well drained conditions pre rains application of municipal compost proved superior to post rains application, but there was no such difference when the drainage was defective. The behaviour of farm compost was exactly the reverse.

For wheat the only yield increases obtained were on the field with defective drainage, due to post rain application of farm compost and to both applications of municipal compost.

The cotton crop did not appreciably respond to manuring.

The experiment needs to be continued before final conclusions can be drawn. It may be that the cumulative effect is not yet intensive enough to show appreciable differences, but the results explain why the proposition of manuring unirrigated crops is

but irrespective of the date of application, and it was much more effective on groundnut when applied before rains than after. It is not possible to say definitely on the basis of the present data whether these two manures differ in their power to improve tilth or

Both these years were very wet (51.82 and 157.50 inches respectively). Hence, the test was repeated in 1935 in a modified form. The rainfall of this year was moderate (34.35 inches). The treatments in this test were —

Main treatments —

Plots—(1) defective and (2) free drainage.

Sub-treatments A —

Kinds of green manure (1) *sua*, (2) *cowpea*.

Sub-treatments B —

Approximate time in weeks after sowing and method of application at each time.

(a) Periods for —

- (1) 8 weeks after sowing
- (2) 10 weeks after sowing
- (3) Eleven weeks after sowing

(b) Methods for —

- (4) Cutting and removing
- (5) Cutting and spreading
- (6) Ploughing in.

The last treatment was omitted for the eleven week period for obvious reasons. The results are —

TABLE 49.
Green manuring with *Sua* for wheat
1 ha. per acre.
A. 1933 test (medium land)

Treatment	Grain	Straw
No green manuring	746	1463
Sowing crop ploughed in	909	1401
Ploughed in at growing stage	597	1335
Ploughed in at flowering stage	571	1074
Cut and removed at flowering stage	764	1202
P	<0.05	<0.05
Significant difference	231	219

B.

1934 test (rich land)

Treatment	Grain	Straw
No green manuring	933	1121
Ploughed in at growing stage	1063	1251
Cut and removed at growing stage	878	1144
Ploughed in at flowering stage	1004	1477
Cut and removed at flowering stage	897	1245

C
Bluea

No green manuring	Ploughed in	Cut and removed	P	Sig diff
1 121	1 364	1 314	<0 05	170

D

1935 test (poor land)

Treatments		Well drained field	Field with defective drainage		
Interval in weeks from sowing	Method of green manuring	Kind of green manure			
		Sann	Cowpea	Sann	Cowpea
0	Cut and removed	252	382	148	280
	Cut and spread	340	280	166	316
	Ploughed in	208	420	260	668
8	Cut and removed	400	440	168	256
	Cut and spread	240	358	196	344
	Ploughed in	284	452	284	430
11	Cut and removed	368	424	140	612
	Ploughed in	424	384	180	468

E

Kind of green manure	Well drained field.	Field with defective drainage	P	Sig diff
Sann	314	191	} <0 05	100
Cowpea	393	428		

F

Cut and removed	Cut and spread	Ploughed in	P	Sig diff
201	278	382	<0 05	78

In the very wet season of 1933 green manuring on a medium field had adversely affected the results. Thus harmful effect increased with the period allowed for sowing effect was visible even when the green manure was ploughed in. There is no depression in yields when the green manure is cut and removed.

Grain yields were not appreciably affected by green manure on fertile land whether ploughed in or cut and removed irrespective of its stage of growth. Ploughing in the green manure irrespective of its stage of growth significantly increased the yields of *dhua* but when the green crop was cut and removed the increase was not appreciable.

In a season of moderate rainfall, 1935 different methods of manuring with *sann* or cowpea were compared on poor land with or without good drainage. The cowpea crop behaved equally well on both types of land but *sann* fared better under well drained conditions. On ill drained land cowpea was superior to *sann* but no such difference was observed under good drainage. Both the green manures proved better when ploughed in.

These results indicate that under local conditions green manures may depress yields even when moisture supply is sufficient. This seems to be due to unfavourable physical condition of the soil preventing aerobic decomposition.

The superiority of the coarse and woody cowpea to the soft *sann* observed on ill drained soil is probably due to the fact that the coarse cowpea has a better root system and The year on that soil for rabbit wash is

(ii) *Unirrigated soils of Rajputana—Manuring methods*—In addition to the use

TABLE 49 *Efficacy of different methods of manuring*
Yield of seed cotton.—lbs per acre
Variety—Deer cotton (local)

Treatment	Pickings.						Total
	1st	2nd	3rd	4th	5th	6th	
Compost	93	105	185	288	219	99	989
Cultivator's method of bullock folding	100	116	170	258	222	108	974
Basu Farm method of bullock folding	90	100	169	294	196	86	935
Cultivator's manure	84	82	141	280	219	138	894
Artificial manure full dose	92	85	163	245	193	99	877
Artificial manure one fourth dose	46	58	116	294	196	84	794
Control (no treatment)	52	64	103	158	145	95	619

A vigorous start followed by uninterrupted development seems to be the result of such treatment

These results are being followed up by a quantitative field trial of a complex design including the following treatments.

Man tree men/s

- (1) Control (no treatment)
- (2) Urine alone supplied by cultivator & cattle folding the dung being removed and weighed.
- (3) Basic modification of cattle folding
- (4) Compost full dose—rate equivalent to nitrogen in full artificial manures
- (5) Compost quarter dose
- (6) Complete artificial manures—rate equivalent to nitrogen in dung supplied by cattle-folding
- (7) Complete artificial manures quarter dose

545 Treatment

- (1) Control (no treatment)
 - (2) Green manuring with *guara* ploughed in at flowering stage
 - (3) Green manuring with *guara* cut and removed at flowering and weighed (to be used for fodder)
 - (4) Green manuring with *sann* as in (2)
 - (5) Green manuring with *sann* as in (3)
- (To be used for cattle bedding)

(To be used for cattle bedding)

test An intensive rotation of wheat and cotton both irrigated has been adopted for this

The results for wheat are available and are tabulated below —

TABLE 50 *Efficacy of different methods of manuring*
Yield of wheat (local) grain—mds per acre

Basu Farm Jaipur 1935-36						
Treatment	No green manure treatment	Guara ploughed in	Guara cut and removed	Sann ploughed in	Sann cut and removed	Mean
Control	15.6	14.4	15.5	16.6	9.7	14.4
Cultivator & cattle folding	20.9	20.2	14.8	15.1	16.9	17.6
Basu modification of cattle folding	24.1	20.8	16.6	20.5	14.4	19.3
Compost full dose	21.2	24.9	19.4	25.2	16.6	21.4
Compost quarter dose	17.3	19.4	14.4	15.1	15.1	16.3
Artificial manure full dose	25.9	21.6	21.6	25.2	20.9	23.0
Artificial manure quarter dose	19.1	14.8	17.3	16.9	9.4	15.5
Mean	20.6	19.4	17.1	19.2	14.7	

Significance
(a) Basic manuring
(b) Green manuring
Interaction is not significant

P	Σ g d.f.
0.03	5 6
0.05	3 0

TABLE 31. *Effect of different methods of manuring*
Yield of wheat (local) *Mus—sida*, per acre.

Treatment.	No green manure treatment	Guara ploughed in	Guara cut and removed	Sown ploughed in	Sown cut and removed
Control	46.1	34.6	46.4	46.5	24.3
Cultural or a cattle-fodling	69.4	57.6	45.7	55.9	45.0
Basal modification of cattle-fodling	63.7	49.7	62.7	54.4	43.3
Compost, full dose	63.7	63.0	54.0	62.7	45.4
Compost, quarter dose	57.6	52.6	40.3	41.0	39.6
Artificial manure, full dose	80.7	64.8	64.5	69.9	48.9
Artificial manure, quarter dose	61.6	45.6	49.0	50.5	32.4
Mean	62.6	52.3	51.5	54.9	41.3

Significance.

Green manuring

P.

<0.05

S.E. d.f.

9.3

Other factors are not significant

The response of wheat to the manuring treatments may differ from that of cotton. The response of wheat to the application of artificial manure is not significantly different from that of cotton. Both the cattle-fodling and the artificial manure treatments are significant.

Straw yields were not affected by any treatment except the ploughing-in of the guara crop and the removal after harvest of both the green manures which a reciprocal effect on yield.

Concurrently with this test another field trial was carried out in duplicate plots simultaneously at six places in Rajputana, with a view to ascertain whether it made any difference on the yields of the subsequent wheat crop if (1) cattle manure is applied in the beginning of the kharif season or at the end of it, before the rabi cultivation (2) whether a supplementary ploughing-in, or harvesting and removal of green manure grown *in situ* will have any further effect. The results are given below—

TABLE 32.—*Effect of different methods of manuring*
Yield of wheat (local) grain—*sida*, per acre.

Places.	Cattle-manure.					
	Kharif			Rabi.		
	Green Manure					
	Ploughed in	Removed	None.	Ploughed in	Removed	None.
Alwar	18.9	17.9	12.4	18.0	18.5	14.4
Jaipur	29.3	30.6	29.3	30.3	25.6	27.5
Jodhpur	20.4	22.9	21.5	21.6	19.1	16.9

Significance.

(a) Places

P.

<0.05

S.E. d.f.

5.48

TABLE 53 — *Efficacy of different methods of manuring*

A.—1 seed of wheat (local) blusa mda per acre

Places.	Cattle manuring					
	Kharif			Rabi		
	Green Manure					
	Ploughed in	Removed	None	Ploughed in.	Removed	None
Alwar	30 5	30 8	22 4	28 6	30 8	24 9
Jaipur	71 8	70 5	60 5	73 9	67 5	63 6
Jodhpur	32 0	29 4	29 8	28 1	25 8	23 1

Significances	P	Sig. diff
(a) Places	<0.05	20.93
(b) Time of application of cattle manure	<0.01	2.25
(c) Green manuring	<0.05	4.40
(d) Places and time of application of cattle manure	<0.05	2.12

The remaining differences are not significant

B (c) *Green manuring*

Ploughed in	Removed	None
44.1	40.8	37.4

C

(d) *Places, Time of application of cattle manure*

Cattle manure applied in	Alwar	Jaipur	Jodhpur
Kharif	27.9	67.6	30.4
Rabi	28.1	65.0	25.7

As far as the grain yields are concerned it is immaterial whether cattle manure is added in the beginning or at the end of the season. Yields remain unaffected whether green manure is grown in addition and ploughed in or removed.

The yield of straw is increased, except at Alwar, when cattle manure is given in the Kharif and it is further increased when in addition green manure is ploughed in.

Yet another experiment was carried out on the estates of Messrs the Bundi Agricultural Syndicate Bundi State in order to test the possible advantage of supplementary dressings of artificial manure after ploughing green manures in the land intended for wheat. Two grades of Nicifos were applied at one and two cwt. per acre.

TABLE 54 *Efficacy of different methods of manuring*

A.

Variety—Local wheat

Mds. per acre

Treatment	Grain			Straw		
	Area B	Area E	Area H.	Area B	Area E	Area H.
Control	29.4	28.3	32.8	40.0	44.5	46.4
Nicifos 22/18 at 1 cwt./acre	35.3	40.8	39.5	67.2	65.8	70.0
Nicifos 22/18 at 2 cwt./acre	32.0	43.9	38.1	76.1	73.7	71.1
Nicifos 17/45 at 1 cwt./acre	32.3	40.2	42.2	40.8	61.2	66.6
Nicifos 17/45 at 2 cwt./acre	37.2	39.4	42.3	73.4	81.2	80.5

Significances	Grain		Straw	
	P	Sig. diff.	P	Sig. diff.
(a) Manure vs. no manure	<0.05	6.9	<0.01	14.8
(b) Units of manure	>0.05		<0.01	13.2
(c) Soil types	<0.05	4.9	>0.05	

All other differences are not significant.

B.

	Artificial manure vs. no manure		Units of manure	
	Manure	No manure	One cwt. per acre	Two cwt. per acre
Grain	38.6	30.2		
Straw	69.0	43.6	61.9	76.0

Both grades of Nicifos were equally effective in increasing the yields of grain and straw. Increased rate of application from one to two cwt. did not influence grain yield but the production of straw increased with the rate of manuring.

The results enumerated above are of great practical value for the Rajputana cultivator whose soils require manure even for unirrigated crops and whose resources of vegetable

residues for making manure are limited. Cattle urine can be utilized by the current method of folding. The droppings which have no additional manurial effect in the system, can be made into compost together with other available residues to be applied to fields where cattle are not tethered or folded.

Green manuring if judiciously used, has its place and it does not seem to be always costing from ect of green rther study Artificial
 a. also be used singly or to supplement green manure. Thus, a great variety of resources are open (subject to economic limitations discussed below) to the local cultivator for satisfying the manurial needs of his land.

Economics—The relative scope for cattle folding, application of compost or artificial manures has been discussed above in the light of crop response. From a practical point of view it is equally important to take into consideration the cost involved. Such records are available mainly from the Jaipur experiments.

TABLE 55 Costs for different methods of manuring

Rupees per acre

Year	Farmer's manure.	Compost from		Cultivator's cattle folding	Basi modification of cattle folding	Artificial manures	
		Dung alone	Dung and residues			Full dose	Quarter dose
1934	Rs a P 1 6 1	Rs a p 3 4 9	Rs a p 4 4 9	Rs a p	Rs a p 2 9 3	Rs a p 31 6 0	Rs a p 7 13 6
1935			0 10 8		2 2 3	25 15 0	6 7 9

Note—(1) Rates Rs per acre—

Compost 1934—6 600 lbs

1935—Full dose—12 320 lbs

Quarter dose—3 060 lbs

(2) Artificial manures—

1934—a mixture of Niclos 22/18 at 296 lbs and pot. sulph. at 111 2 lbs per acre

1935—Full dose—Niclos 17/45 at 118½ lbs amm. sulph at 174 6 lbs and pot. sulph at 110

lbs per acre mixed together Quarter dose—One-fourth of the above quantities

Details of cost—Farmer's manure—Ten cartloads (120 mds) of the manure were made according to the cultivator's usual method. The costs involved were ¼ cost of making pit 2 as, charging 3 as, carting Re 1 9 and spreading 4 as, Total Rs. 2 2

Cultivator's cattle folding—No cost was involved because the land gets the treatment during routine cattle management

Basi modification of cattle folding—The only cost involved is for mixing the dung and urine earth uniformly with the soil. Folding was done in 1934 with three bullocks, one buffalo and one cow on a 1/35 acre plot for three days. The cost for spreading was 9 p. for the plot

In 1935 four cows and four bullocks were tethered on a 1/44 acre plot for three days. The cost involved was 9 3 p per plot

Farm compost making—Ten cartloads (120 mds) were made in 1934 by the standard Indore method. The costs involved were $\frac{1}{2}$ cost of making p t 4 as. charging 6 as. watering Rs 1 2 turning Rs. 1 1⁰ 6 collection of bedding Re 1 carting Rs. 1 9 and spreading 4 as. Total Rs 6 5 6

In 1935 466 3 mds of bedding were composted by the rain watered process with 155 5 mds. of dung which produced 513 mds of ripe compost. The costs involved were collecting and removing the dung from fields Re 1 8 4 charging heaps Rs. 5 0 8 and turnings Rs 2 12 0. Total Rs. 9 5 0. Rate of wages for one man day of 8 hours = 4 as.

No cost is incurred by the cultivator in folding and there was no significant difference between the yields obtained by this method and by the quarter rate of compost. The yields obtained by both these methods were not significantly different from those obtained

it

It is necessary however to ascertain the cumulative effects of these treatments both on cotton and wheat before final conclusions are drawn.

The results from Bundi reported above show that an average increase of about 10% in the yield of cotton is obtained by the use of compost. This increase is one cwt and will

a ed be ow —

TABLE 56 *Response of local crops to manuring*

Gang Canal Colony Sriganaganagar Bikaner

Lbs per acre of grain for *toria*, wheat and *hi* kapas for cotton and tons per acre for maize and cowpea mixed fodder

A

Treatments in 1932

Crop	With Compost	Without Compost	P	Significant difference.
<i>Toria</i> (1932)	702	561	<0.05	88.3

Compost was applied at a rate equivalent in nitrogen content to that supplied by green manures.

B

Treatments in 1932

Crop	Fallow	Green manure		P	Significant difference
		Guara	Sann		
Toria (1932)	940	534	504	<0 05 0 01	110 6
Cotton (1933)	742	893	959		143.5

C

Treatments in 1932

Crop	Green manure		P	Significant difference
	Ploughed in	Cut and removed		
Cotton (1933)	1066	850	<0 01 <0 01 <0 01	143 5
Maize and Cowpea mixed	5 57 tons	4 71 tons		0 75 tons
Tu	218	170		45 0

D

Treatments in 1934

Crop	Fallow	Guara		P	Significant difference.
		2 months after sowing	At flowering		
Toria (1934 35)	1 361	1,107	1 089	<0 05	205 0
Wheat (1934 35)	1,788	1,943	1 984		

E

Treatments in 1934—Cotton in 1935 36

Crop	Fallow		Guara ploughed in 2 months after sowing		Guara ploughed in at flowering stage	
	*Compost	No Com post	*Compost	No Com post	*Compost	No Com post
Cotton	306	281	327	341	408	338

All factors and interactions are non significant

*Compost at 20 carts per acre

F.

1934 35

Variety and treatment	Control	Castor cake at 1,000 lbs per acre	Nisfos 22/18 at 170 lbs per acre
Mollisoni			
Heavy irrigation, May sowing— Plant spacing 6"	673	794	1 057
" " 12"	666	782	1,099
Moderate irrigation— Plant spacing 12"	746	1,031	679
P 289 F			
Heavy irrigation, May sowing— Plant spacing 6"	724	1,153	1 140
" 12"	782	1,102	955

Note—Green manural treatment was given before the *toria* or wheat crops other crops followed without repetition of the treatments

It is quite clear that compost under local conditions benefited only the crop immediately following (*toria*, 1932). Green manure is distinctly harmful when ploughed in for a crop (*toria*) sown in October but is distinctly beneficial when it is sown in November (wheat).

Compost shows no residual effects while those of green manure can be seen for three succeeding crops—cotton, *toria*, and wheat. The effect however is not so marked. It makes very little difference in the sowing or a small (10 days). Ploughing in the green manure seems to be better than simply growing, harvesting and removing it.

The scope for the use of artificial manures seems to be even greater, but the conditions optimum for their utilization still require careful determination.

(b) Soil erosion—Several plants of different habits of growth have now shown themselves capable of regenerating every year, either vegetatively or from fallen seed, when grown without irrigation on the black cotton soil of Indore. In addition, there are some with an ever-green habit. Attempts are now being made to discover the best method of using them to form root bound bunds along field contours as checks to sheet erosion by heavy rains. Most of the crops have a good feeding value. The following table includes the most promising varieties—

TABLE 57 Plants likely to be useful for erosion control

Name	Habit	Mode of regeneration
<i>Grasses</i>		
<i>Paspalum dilatatum</i>	Stools short	Vegetative & seed
Kikuyu grass	Creeping	" "
Budaa grass	Stools erect, medium height	" "
Guinea grass	Stools, tall	" "
<i>Pennisetum purpureum</i>	" "	" "
Wimmera Rye grass	Stools short	" "
Kharra grass	" "	" "
<i>Other plants—</i>		
Chicory	Dwarf, erect	Seed
Kollings	Dwarf, spreading	"
<i>Tephrosia Candida</i> and <i>Fogelia</i>	Tall	"
Tur (<i>Cajanus indicus</i>)	Tall, branching	"

(c) Crop rotations An experiment comparing five rotations was started in 1933. They were—

Year	Rotation				
	1	2	3	4	5
First	Wheat	Cowpeas followed by wheat	Cowpeas followed by wheat	Groundnut	Groundnut
Second	Jowar	Groundnut	Jowar	Jowar	Cowpeas followed by wheat
Third	Tur	Jowar with tur	Groundnut	Cowpeas followed by wheat	Jowar
Fourth	Cotton	Cotton	Cotton	Cotton	Cotton.

The experiment has run for three years, the results with cotton are given below

TABLE 58

The Influence of previous crops on cotton at Indore

1933—35

Yield of kapas lbs per acre

Year	Previous Crops			P	Sig diff
1934	<i>Tur</i>	Groundnut	Cowpeas Wheat	> 0.05	100
	177	197	153		
	<i>Jowar and tur</i>		<i>Jowar</i>		
1933	215		331	} < 0.05	100
1935	325		333		

In 1934 cotton yields did not vary significantly whether the previous crop was tur groundnut or cowpeas followed by wheat. This was a very wet year and it is not yet certain if similar results will be obtained in a normal season because in the year 1935 of moderate rainfall though the yields of cotton after *jowar* showed no increase they were significantly higher after *jowar* and *tur* than in the wet year 1933. This means that in a wet year cotton yields may be depressed if the previous crop is *jowar* with *tur*.

Other crops—The yield of dry groundnuts following cowpeas and wheat and those of wheat grain following groundnut in the previous year and a catch *khari* crop of cow peas are given below —

TABLE 59

Yields of groundnuts and wheat grain

Lbs per acre

Indore 1933 and 1935

Year	Groundnut	Wheat	P	Sig diff
1933	1622	282	} < 0.05	100
1935	264	379		

Differences in season made no difference in the yield of wheat. The low yields of groundnut in 1935 were due to the damage done by jackals at the ripening stage.

(d) *Eradication of Kans*—The field trials to eradicate *kans* with monsoon covers of green grass or *sann* hemp mentioned last year were completely successful. Besides achieving total eradication of the weed the subsequent wheat crop on the former weed patches in each field grew better than in the surrounding area and gave higher yields of a better quality of grain with more straw. The organic matter content of the soil in these patches was found, after the harvest of the crop to be higher in the first six inches than in the soil from the rest of the field.

TABLE 60.

Influence of biological eradication of weeds on subsequent crop and soil.

	Mean yield, Lbs. per acre		% Mean composition (On oven dry basis)					
	Grain.	Straw	Soil organic matter		Grain.			
			0 6"	6 15"	Total nitro- gen.	Albami- noid nitro- gen	Gluten.	Starch.
Normal fields	427	672	0 67	0 70	1 05	0 82	8.04	49 23
Weed-eradi- cated patches.	811	908	0 88	0 70	2.07	1 13	11 53	31.79

The method has now been adopted as a routine on the Institute Farm.

(c) *Poisoned Baits*—*Rat poison*—It is well known that rats soon learn to avoid poisoned baits of the usual types, thus reduces their utility. After several trials it was found that the inclusion of animal grease and glue in the baits made them irresistible for much longer and they have proved most efficacious. Baits prepared in this way met with a wide demand.

Poisoned-bran bait for white ants and other insects—The composition of this bait has also been improved. It was found to be very effective at Bharatpur and Bundi where the soil was irrigated after application. Two to three applications at 20 lbs per acre were found necessary before white ants completely disappeared.

13. COMPOST MANUFACTURE.

Farm refuse.—Rain-watered compost was made on cultivators' fields in Jaipur and Jodhpur. The work was very well organized with the following results.

At Jaipur compost was made at twenty four places in twenty one villages distributed all over the State. The raw materials used were katchra (village and farm refuse) 1000 ft. of raw materials was used. Twenty-one cultivators made compost. Of these six of such a rapid process effected to the extra space were indifferent.

At Jodhpur compost was made at five places. The quantity of raw material yielded 85 per cent. by volume of finished compost. It appears to be due to the extensive use of the product superior to his usual half rotted manure. The cultivators applied the compost to wheat fields. One of them reported increased yields. It was also used by one cultivator as a top-dressing for lucerne. Some of them preserved it for the kharif crops of 1936.

14 PUBLICATIONS

The following papers have been submitted for publication within the period of this Report —

An analysis of the efficiency of selection methods used in the improvement of Malvi cotton by J B Hutchinson and Kuberaingh

'Genetic principles and the problem of cross breeding for milk yield in Indian cattle by J B Hutchinson and N R Joshi

'An examination of R D Bose's analysis of a serial experiment by J B Hutchinson and V G Panse

The introduction of improved strains of crop plants in Central India and Rajputana" by J B Hutchinson and V G Panse

Papers were read before the bodies named those marked with an asterisk have also been submitted for publication

At the Symposium on Disease Resistance in Plants held at Coimbatore in October 1935 under the joint auspices of the Indian Academy of Sciences the Association of Economic Biologists and the Society of Biological Chemists —

*Studies in Disease Resistance, I Cotton Wilt and Environment By K N Ambegaonkar and Yeshwant D Wad

*Studies in Disease Resistance II Leaf roll and Red leaf of American Cottons By I Madhusudan Rao and Yeshwant D Wad

Before the Agricultural Section of the Indian Science Congress during its 23rd Session at Indore in January 1936 —

- | | | |
|----|---|--|
| 1 | Optimum number of buds for sugarcane setts | G C Tambe and S C Talesara |
| 2 | Biological eradication of <i>kans</i> | G C Tambe and Y D Wad |
| 3 | *Manuring of cotton for yield in Malwa | C K Chhaya and P M Kulkarni |
| 4 | Importance of complex designs in agronomical experiments. | S Shamsher Singh and P M Kulkarni |
| 5 | Treatment of sugarcane setts to improve germination and yield *Combined with No 1 | G C Tambe and S C Talesara |
| 6 | The use of Revenue Settlement Records for agricultural workers | K A Singh L Swaroop and R K. Aurangabadkar |
| 7 | Humus supply to irrigated arid soils .. | S Shamsher Singh and P M Kulkarni |
| 8 | Preparatory cultivation for wheat in Malwa .. | G C Tambe S C Talesara and L Swaroop |
| 9 | Cold weather cultivation of vacant fields and interculture of standing crops in Malwa | G C Tambe and S C Talesara |
| 10 | Comparative study of regional soils | L N Desai and S C Chakrabarty |
| 11 | *Root studies—their scope in Agronomy, I | N S Apte |
| 12 | *Root studies—their scope in Agronomy II | K M Simlote and R K Aurangabadkar |
| 13 | Influence of soil moisture relationship on crop growth | I M Rao R K. Aurangabadkar and B Goswami |
| 14 | Groundnut an investigation into its cultivation in Malwa | G C Tambe and S C Talesara |
| 15 | *Cotton yields as affected by soil condition and nutrients | S B Mogre and G T Shahane |

- | | | |
|----|---|--|
| 16 | *Efficient production of tobacco seed | S B Mogre and V. N. Bhargava |
| 17 | The relation between light and other factors in plant development | I M Rao and S Ghosh |
| 18 | The influence of treatment and the cotton crop on the soil profile | S C Chakrabarty and L N Desai |
| 19 | Cambodia cotton in Jaipur | Tarachand Kala and O K Sant |
| 20 | Soil texture, nutrition and staple length of cotton | S B Mogre and Y D Wad |
| 21 | <i>Bayra</i> and <i>Tur</i> in Jaipur State | K R Joshi T Kala and P M Kulkarni |
| 22 | Tobacco curing for bright leaf—sample adjustments | S B Mogre and O T Shahane |
| 23 | Sugar beet—a possible cash crop for Central India and Rajputana | I M Rao and S Ghosh |
| 24 | *Seed quality and crop vigour | R K Aurangabadkar and B Goswami |
| 25 | *Cultivation of high quality paddy in unpuddled black cotton soils | C L Nagar T Krishna moorthi and P M Kulkarni |
| 26 | Sugarcane x sorghum crosses in Malwa and Rajputana | G C Tambe S C Chakrabarty and V R Sathie |
| 27 | The possibility of the Soyabean crop in Central India | R K Aurangabadkar and B Goswami |
| 28 | Initial start to cotton seedlings with differing soils and nutrition. | I M Rao and C L Nagar |

Before the Medical and Veterinary Section during the same session —

(1) 'The utilization of antiseptics and coagulants in composting habitation wastes' by M A Nicholson and S C Chakrabarty

(2) 'The Indore process for disposing of habitation wastes at Alwar' by C L Nagar

A joint discussion of the Science Council and its application
by the Medical and Veterinary Sections
of the Science Council and habitation wastes

A letter to the Editor of *Nature* on the position of agricultural composts relative to that of inorganic fertilizers was published over the names of F K Jackson and Y D Wad

The following Bulletins and Leaflets have been published or reprinted —

Bulletin No 1 — "The sanitary disposal and agricultural utilization of habitation wastes by the Indore process" by F K Jackson and Y D Wad (reprinted with additional matter)

Bulletin No 2 — "The supply of humus to soils" by F K Jackson, Y D Wad and V G Panse (reprinted and revised)

Bulletin No 4 — "Studies in the technique of field experiments" by J B Hutchinson and V G Panse

Leaflet No 12 — "Eradication of Kana" (English)

Leaflet No 13 — "The Indore method of sugarcane cultivation" (English)

Leaflet No 14 — "Silage making from grasses in dry regions" (English)

THE WORKING OF THE FARM

15 FIELDS TRIALS

The following experiments were conducted —

Humus Supply—Incorporation of organic matter in the soil Green manure with weed eradication Improvement of water logged soils

Soil Improvements—Control of soil erosion by contour strips sowing and the use of arrester crops Effect on the succeeding crop of cultivation of land in winter at different depths by different implements Tests on the efficiency of different implements of interculture Seedling vigour and yield of cotton

Rotation—Rotation of crops Influence of previous crop on cotton

Associated growth of crops—Association of paddy varieties with cotton groundnut and tur

Weed eradication—Eradication of weeds by biological means

Treatment of seed—Treatment of sugarcane setts with lime water before planting

Multiplication of seed—Paddy 34 Varieties Soyabeans 10 varieties Peas 4 varieties Jukuyu grass Onions 2 varieties Banana 4 varieties *Reana luxurians* Sorghum sugar cane hybrids 6 crosses Co canes 14 varieties

Sugarcane—Pre treatment of cane setts Germination of cane setts with varying number of days before sowing Time and October use of cane g of Pre ulating the

Lucerne—Late sowing of lucerne with reduced irrigation Lucerne manual

Sugar beet—Comparison of the yields of local fodder carrots and sugar beets

Mangolds—Small growth trials 10 varieties

Tobacco—Bulk cropping of cigarette *parda* wrapper and *lukla* varieties

Compost Preparation of bone char—fixing the technique Composting of cattle trash for horticulture Composting of cow dung alone—further trials

16 CROPS AND YIELDS

	Yield in maunds per acre	
	Maximum	Minimum
Cotton Malvi 9	6 0	0 75
Groundnut Akola 10	16 22	3 40
Jowar Ramkel	13 95	10 30
Paddy Irrigated and unirrigated	4 90	
Tur	13 1	10 75
Gram	10 0	0 60
Linslee	7 20	1 67
Wheat Malvi	9 35	2 50

Sugarcane
Varietal Field 38 II

Ratoon
1935 36

Plat cane
1934 35

Variety	S 49	702	319
Co 251		670	445
Co 213		702	461
Co 210		712	531
Co 290		760	610

Sugarcane Sorghum hybrids Field 38 IV

Co 351	716
Co 352	62
Co 353	600
Co 355	086
Co 356	464
Co 357	564

Sugarcane varietal F 32

Range of yield in mds
per acre

Co 231	563 to 673
Co 210	616 to 782
Co 213	988 to 1 270
Co 290	1 008 to 1 210

Sugarcane setts

Untreated

Treated
with lime

Co 290	712	1 012
--------	-----	-------

Sugarcane yield for whole area of 1 32 (1 4 acre)

Number of
canes per
acre

Yield in
mds. per
acre

Irrespective of treatments	31 800	1,224
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Lucerne—Agronomical experiments on lucerne in previous years did not bring out

The yield is as follows:—

	lbs per acre
Winter	13 424
Summer	12 278
Mean	11 727
Total	37 429

17 GENERAL

(a) *Industries*—There are now 13 pairs of bullocks among which two Kankrej pairs only survive of the original 1923 pair and the remainder having been bought in the last two years. These are of Malvi breed and of average size as usually found with cultivated

43 tons of manure were required from the available farm wastes and 30 cart-loads of industrial refuse for the remainder.

230 tons of dung were also required.

(b) *Workshop*—The technical staff were kept busy in repairing and maintaining the workshop and the machinery for building roads etc.

(c) *Financial statement*—The total amount from the farm amount to Rs. 6500 a marked increase over the last year when crop values were lowered by adverse seasons.

(d) *Practical instruction and help to cultivators*—Instruction was given in practical matters in the field with the following places, the periods ranging from a year to a few days.

Hisar State

Sheikhpur

Aligarh

Aligarh (Department of Agriculture, C. P. and Municipality)

Mysore

Aligarh State

Bihar State

200 Students from the Union College, Indore were given

12 of the highman and soldiers were frequently sent out for demonstration work in the local agricultural districts.

PROPAGANDA AND EXTENSION WORK IN STATES

18 VISIT TO STATES

During the year under report the Agricultural Adviser made fifteen visits to the States. The Extension Officer sixteen the Geneticist and Botanist two the Chemist and Agronomist and other staff thirty two.

19 INSTRUCTION AND TRAINING FACILITIES

No fixed courses are provided but practical training is given at the request of the Debari members of the Revenue and Agricultural Affairs and selected cultivators the portions of instruction being varied in its items to suit individual cases. No fees are charged and free accommodation is usually provided in the Institute's Visitors' quarters.

Training both in composting farm refuse and habitation wastes was given to Agricultural and Sanitary Officials and sweepers from member States and outside, the latter process with the aid of the Indore Residency Area Authorities.

Lectures and demonstrations were given by the Extension Officer in district tours to large village audiences. He explained the advantages of growing good crop varieties, of increasing their manure supply by making rain watered compost from farm wastes, of making grass plots and bonafide for their cattle either in pits or in mud walled alleys, to suit the local conditions of the practical possibility of improving their cattle by castrating "scrub" bulls, the lower cost of making better quality *gur* by the McGlashan furnace and a variety of other improvements within the capacity of ordinary cultivators.

Ploughmen trained in building the McGlashan furnace and in *gur* making were placed at the disposal of the Debari.

Assistance was also given by the Extension Officer in organizing demonstrations at Agricultural shows and cattle fairs in many of the States. Illustrative exhibits were provided, lectures delivered and cinematograph films shown of agricultural and rural uplift subjects accompanied by running commentaries.

Acknowledgment is due to the Indian Central Cotton Committee and the Central Publicity Officer, Railway Board for the free loan of films. Four films produced by the Institute are now ready for display and others are in preparation.

F. K. JACKSON
Director

18th July 1936

INSTITUTE OF PLANT INDUSTRY, INDORE

PROGRAMME OF RESEARCH WORK FOR 1936-37

Genetics and Botany Section

COTTON

- (1) *Botanical Survey*.—Further work in the light of
 - (a) information collected from old records
 - (b) collection of medium staple cottons from short staple areas
 - (c) the request of the Indian Central Cotton Committee for an investigation into the possibilities of improving Dholeras cotton
- (2) *Genetics*.—Study of inheritance of major factors in Asiatic and Indian American cottons
 - Study of cases of abnormal inheritance of major factors
 - Study of the inheritance of quantitative characters.
 - Study of interspecific hybrids with special reference to the bearing of heterosis on plant breeding procedure
 - Study of the rate of mutation in mutable strains.

(3) *Cytology*—Study of sterile types derived from an interspecific hybrid (G arboreum G herbaceum)

Study of chromosome behaviour in F₁, F₂ and backcrosses of G anomalum x cultivated Asiatic cottons

(4) *Physiology*—Study of cotton hair characteristics

Development of tests for lint quality suitable for the needs of the plant breeder
Study of relative selection values of four simple genotypes in Malwa and Nimar

(5) *Selection and Breeding*—Propagation and distribution of Malvi 9

Study of variance in Malvi 1, Malvi 9, and the crosses between them, and re selection for further propagation according to the results obtained

Study of and re selection in progeny rows of 1933 selections

Study of problems of transference of herbaceum quality to Malvi type

Study of Cambodia selections grown at Badnawar

Study of selections in Nimar *desi* made in 1933 and grown in 1934 at Dhamnod

(6) *Variety Trials*—Variety trials will be laid down at the Institute and in the territory of member States as found necessary in the light of results obtained from current trials

(7) *Study of ...*

OTHER CROPS

Work on other crops will be largely confined to the selection and purification of desirable high yielding strains for the main areas served by the Institute, and fundamental research will usually be restricted to cotton. Exceptions from this rule will occur from time to time when opportunities arise of solving general problems more easily than could be done on cotton and plant breeding material will, of course, be used to the fullest possible extent to provide data of scientific value

(1) *Botanical*—Comparative developmental study of durum and bread wheats

(2) *Genetics*—Study of inheritance of certain characters in local durum wheats

(3) *Selection and Breeding*—Selection and breeding work will be continued on the following crops—

<i>Kharif</i>	<i>Rabi</i>
Jowar	Wheat
Bajra	Barley
Tur	Gram
Till	Linseed
Niger	Kesari
Groundnut	Safflower

A part at least of the breeding material in these crops will be grown on the farms of member States

(4) *Variety Trials*—Variety trials on all crops of interest to member States will be laid down in the light of information gained from the current season's experiments

(5) *Lathyrism*—Work on *Kesari* is being continued and in connection with it the botanical and agricutural problems involved in the growth of the associated weeds responsible for lathyrism are being studied

APPENDIX A

THE BOMBAY COTTON CONTROL ACT 1935

AN Act to provide for the prohibition of the cultivation of Goghari cotton and the mixing of such cotton with other cotton and for the prohibition or restriction of the possession or use of or trade in Goghari cotton or cotton mixed with Goghari cotton

WHEREAS it is expedient in the best interests of the growers of cotton in certain areas in the Presidency of Bombay the cotton trade and the economic prosperity of the said Presidency to maintain the quality and reputation of the cotton grown in those areas and for that purpose to prohibit the cultivation of Goghari cotton and the mixing of such cotton with other cotton and to prohibit or restrict the possession or use of or trade in Goghari cotton or cotton mixed with Goghari cotton

And whereas the previous sanction of the Governor General required by sub section (3) of section 80A of the Government of India Act and the previous sanction of the Governor required by section 80C of the said Act have been obtained for the passing of this Act, It is hereby enacted as follows—

1 *Short title and extent*—(1) This Act may be called the Bombay Cotton Control Act 1935.

(2) It extends to the whole of the Presidency of Bombay

2 *Definitions*—In this Act unless there is anything repugnant in the subject or context—

(a) Cotton includes cotton plant ginned and unginned cotton cotton waste and cotton seed

(b) Director of the culture means the officer appointed for the time being to be the Director of Agriculture

(c) Goghari cotton means the kind of cotton known as *Gossypium herbaceum* (Parasi Goghari) and

(d) 'Controlled area' means an area specified in a notification under section 3

3 *Power to issue notification prohibiting the cultivation etc of Goghari cotton*—The Local Government may by notification in the *Bombay Government Gazette* in such local area and for such period as may be specified in the notification—

(a) prohibit the cultivation of Goghari cotton or

(b) prohibit the mixing of Goghari cotton with any other cotton or

(c) prohibit or restrict the possession or use of or trade in Goghari cotton or any other cotton mixed with Goghari cotton

4 *Penalty*—Any person who knowingly in contravention of the provisions of this Act or of any notification issued under section 3 or rule made under section 14—

(a) cultivates Goghari cotton shall on conviction be punishable with fine which may extend to rupees twenty for the first offence and to rupees fifty for every subsequent offence

(b) (i) mixes or causes to be mixed Goghari cotton with any other cotton or

(ii) possesses uses or trades in Goghari cotton or any other cotton mixed with Goghari cotton,

shall on conviction, be punishable with fine which may extend to rupees five hundred for the first offence and to rupees one thousand for every subsequent offence

5 *Confiscation*—Whenever an offence under this Act has been committed, all cotton in respect of which the offence has been committed and every box, receptacle, package or covering in which such cotton is contained shall be liable to confiscation.

6 *Procedure in confiscation*—(1) When in any case tried by a Criminal Court, the Court decides that anything is liable to confiscation under section 5 he may, after hearing the person, if any, claiming any right thereto and the evidence, if any, which he produces in support of his claim, order confiscation.

(2) When an offence under this Act has been committed and the offender is not known or cannot be found or when anything liable to confiscation under this Act is found and is not claimed by any person, the officer authorised by the Local Government in this behalf may hold an inquiry and may order confiscation

Provided that no such order shall be made before the expiration of one month from the date of seizing the thing liable to confiscation or without hearing the person, if any, claiming any right thereto and the evidence, if any, which he produces in support of his claim

7 *Compounding*—(1) The officer authorised under sub section (2) of section 6 may accept from any person who is reasonably suspected of having committed an offence under section 4 a sum of money as may be prescribed by rules made under section 14 by way of composition for such offence

(2) On payment of such sum such person, if in custody, shall be set at liberty and if proceedings in any criminal court have been instituted against such person in respect of such offence the composition shall be deemed to amount to an acquittal and no further proceedings shall be taken against such person in respect of such offence

(3) Notwithstanding anything contained in sub section (2), it shall be lawful for the court or the officer authorised under sub section (2) of section 6 to order confiscation of anything liable to confiscation under section 5

8 *Power of entry and seizure*—(1) Any officer authorised in this behalf by the Local Government may between the hours of 6 a m and 6 p m—

(a) enter upon any land in a controlled area in which he knows or has reason to believe that Goghari cotton has been or is being cultivated in contravention of a notification under section 3, uproot or cause to be uprooted such cotton, and seize the cotton so uprooted, or

(b) enter upon or into any land, building, ship vessel, vehicle or place in a controlled area in which he knows or has reason to believe that Goghari cotton or any other cotton mixed with Goghari cotton is kept in contravention of a notification under section 3, and seize such cotton

(2) Every officer seizing any cotton under this section shall forthwith—

(a) make a statement in writing of the cotton seized and of the place from which it was seized and	nd
Classify the cotton as to its quality and	ng
or	to
	on

(b) subject to rules made under section 14, forward such cotton to the nearest officer authorised by the Local Government to receive it, for examination and for report to the Director of Agriculture

(3) The opinion of the officer authorised under sub section (2) regarding such cotton recorded in any document signed by such officer shall be evidence as to the nature of such cotton in any inquiry trial or proceeding under this Act

9 *Duty of owner occupier and person in charge to give facilities for inspection by authorised officer*—(1) Every owner occupier or person in charge, of any land building ship vessel vehicle or place shall give all reasonable facilities to the officer authorised under sub section (1) of section 8 to inspect such land building ship vessel vehicle or place.

(2) Any person who contravenes the provisions of sub section (1) shall on conviction, be punishable with fine which may extend to rupees twenty

10 *Previous sanction and limitation for prosecution*—No prosecution under this Act shall be instituted without the previous sanction of the Director of Agriculture

11 *Cognizance of offences*—No criminal court inferior to that of a Presidency Magistrate or a Magistrate of the Second Class shall try any offence under this Act

12 *Protection for acts done under the Act*—No suit prosecution or other legal proceeding shall be instituted against any person for anything which is in good faith done or intended to be done under this Act

13 *Officer acting under the Act to be public servant*—Every officer acting or purporting to act in pursuance of the provisions of this Act shall be deemed to be a public servant within the meaning of section 21 of the Indian Penal Code

14 *Rules*—(1) The Local Government may make rules not inconsistent with the provisions of this Act for the purpose of carrying into effect the purposes of this Act

(2) In particular and without prejudice to the generality of the foregoing provision, the Local Government may make rules for all or any of the following purposes namely—

(a) to prescribe the sum of money to be paid by way of composition under section 7,

(b) to prescribe the conditions subject to which cotton seized may be forwarded under section 8,

(c) any other matter which is to be or may be prescribed

(3) Any such rule may provide that a contravention thereof shall be punishable with fine which may extend to rupees fifty

(4) The rules made under this section shall be subject to the condition of previous publication in the *Bombay Government Gazette*

(5) Rules made under this section shall be laid upon the table of the Bombay Legislature and shall be liable to be annulled or amended to have been

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APPENDIX VI.

BOMBAY ACT No IV OF 1936

(First published after having received the assent of the Governor General,
in the 'Bombay Government Gazette' on the 16th March 1936)

An Act to amend the Cotton Ginning and Pressing Factories Act, 1925
in its application to the Presidency of Bombay

the Government of India Act have been obtained for the passing of this Act. It is hereby enacted as follows —

1 *Short title extent and commencement*—(1) This Act may be called the Cotton Ginning and Pressing Factories (Bombay Amendment) Act, 1936

(2) This Act shall extend in the first instance to the Province of Sind or such area in the said Province with effect from such date as the Local Government may by notification in the local official *Gazette* appoint. The Local Government may by notification in the local official *Gazette* extend the provisions of this Act to any other area with effect from such date as the Local Government may appoint in the said notification

2 *Amendment of section 2 of Act XII of 1925*—In section 2 of the Cotton Ginning and Pressing Factories Act 1925 hereinafter called the said Act —

(1) after the word, comma and dash context,—“ the following shall be inserted namely —

“(aa) ‘admixture of cotton’ means a prescribed mixture of different varieties of cotton,” and

(2) after clause (f) the following clause shall be inserted, namely —

“(ff) ‘licence’ means a licence granted under section 2A ”

(3) after clause (h) the following clause shall be inserted, namely —

“(i) ‘Season’ means such period as may from time to time be prescribed ”

3 *Insertion of section 2A in Act XII of 1925*—After section 2 of the said Act, the following section shall be inserted, namely —

“2A *Licence for working cotton ginning factory or cotton pressing factory*—

(1) No cotton ginning factory or cotton pressing factory shall be worked without a licence granted to the owner thereof by such authority, in such form, subject to such conditions and on payment of such fee, as may be prescribed

(2) (a) A licence for which the prescribed fee has been paid shall be liable to be refused only on the ground that the owner or person in charge of a cotton ginning or cotton pressing factory in respect of which a licence is applied for has been convicted of an offence punishable under this Act

(b) A licence shall be liable to be suspended, withdrawn or cancelled only on the ground that the owner or person in charge of the cotton ginning or cotton pressing factory in respect of which a licence was granted has been convicted of an offence punishable under this Act.

Provided that no licence shall be suspended, withdrawn or cancelled under this clause until after the expiration of the season in which the said owner or person has been so convicted.

(3) If any person works a cotton ginning or cotton pressing factory in respect of which a licence has not been granted or has been suspended, withdrawn or cancelled, such person shall be punishable as follows—

(a) on a first conviction with fine which may extend to five hundred rupees and if the offence has continued for more than one day with an additional fine which may extend to one hundred rupees for every day subsequent to the first day during which the offence has continued; and

(b) on every subsequent conviction with fine which may extend to fifteen hundred rupees and if the offence has continued for more than one day with an additional fine which may extend to two hundred rupees for every day subsequent to the first day during which the offence has continued.

⁴ Amend section 3 of Act VII of 1925. In sub section (2) of section 3 of the said Act—

(1) the word 'and' shall be omitted and

(2) the following words shall be added at the end—

and the prescribed particulars as supplied by such person of the cotton ginning factory where it has been ginned.

⁵ Insertion of new sections 3A, 3B and 3C in Act XII of 1925—After section 3 of the said Act the following new sections shall be inserted, namely—

'3A. Prohibited to be ginned or pressed in any area specified in the notification under sub section (1) of section 3 of the said Act—

may be	the Local Government
such as	certified in
or pressed	is ginned
of cotton	mixture

(2) Any owner of a cotton ginning or cotton pressing factory or any person in charge of such factory—

(a) who knowing or having reason to believe that any cotton is watered or contains seed in excess of the prescribed proportion or contains any foreign substance, gins or presses or allows such cotton to be ginned or pressed in such factory, or

(b) who in any area specified in the notification under sub section (1) gins or presses or allows to be ginned or pressed any cotton which he knows or has reason to believe to contain an admixture of cotton

shall on conviction, be punishable with fine which may extend to five thousand rupees.

(3) Any owner of cotton who knowingly waters any cotton which is ginned and which is being or is intended to be pressed in a cotton pressing factory, or mixes seed or foreign substance with such cotton, or in any area specified in the

sub section (1) makes any admixture of cotton or abets or knowingly allows or connives at any such watering mixing or admixture of cotton shall on conviction be punishable with fine which may extend to five thousand rupees

Explanation—For the purposes of this section, cotton shall not be deemed to be watered unless such cotton contains moisture in excess of the normal quantity. The normal quantity of moisture in any given quantity of cotton is the amount of moisture that such cotton is reasonably expected to have regard being had to the quantity of such cotton that a given quantity of cotton possesses if the latter quantity exceeds the former it shall be evidence until the contrary is proved that the cotton is watered

(1) The Local Government or motion divisions use of cotton or the contents of such package or bale to be examined by the prescribed person or body

(2) A certificate given by such person after examination of the contents of any bale under sub section (1) shall be admissible in evidence and be presumptive proof of the facts mentioned therein until the contrary is proved

3C *Entry and arrest*—(1) The Local Government or a gazetted officer to enter any factory or cotton pressing or contravention thereunder or of any in respect of such factory and to seize all things in respect of which an offence punishable under this Act appears to have been committed

(2) The owner or the person in charge of every cotton ginning or cotton pressing factory shall give every reasonable assistance to the inspecting officer in the performance of his duties under sub section (1)

(3) The owner or the person in charge of such factory shall, in every instance, be permitted to attend during the inspection and the things seized during such inspection shall be sealed in the prescribed manner

6 *Amendment of section 5 of Act XII of 1925*—For section 5 of the said Act, the following section shall be substituted, namely—

"5 *Returns*—(1) The owner of every cotton ginning factory shall submit to the prescribed authority within such time and in such form as may be prescribed monthly returns showing the quantity of cotton ginned in the factory during the preceding month and from the commencement of the season to the end of that month

2 The Local Government shall compile from the monthly returns submitted under sub section (1) and shall publish in such manner as the Governor General in Council may direct a statement showing the total quantity of cotton ginned in the province during the month and from the commencement of the season to the end of the month to which the returns relate

Provided that the quantity of cotton ginned in any individual factory shall not be published

(3) The owner of every cotton pressing factory shall submit to the prescribed authority, within such time and in such form, as may be prescribed, weekly returns showing the total number of bales of cotton pressed during the preceding week and from the commencement of the season to the end of that week, and the approximate average net weight of the bales pressed in that week.

(4) The Local Government shall compile from the weekly returns submitted under sub section (3), and shall publish in such manner as the Governor General in Council may direct, a statement showing the total number of bales pressed in the province during the week and from the commencement of the season to the end of the week to which the returns relate :

Provided that the number of bales pressed in any individual factory shall not be published

(5) If default is made in submitting any return as required by sub section (1) or sub section (3), the owner of the factory shall, on conviction, be punishable with fine which may extend to fifty rupees.

(6) Where the owner of a cotton ginning or cotton pressing factory has notified to the prescribed authority that the work of ginning cotton or pressing bales in that factory has been suspended it shall not be necessary for the owner to submit returns under sub section (1) or sub section (3) until such work has been resumed "

7 *Amendment of section 6 of Act XII of 1925*—In section 6 of the said Act, after the words "other than" the words and figures "the standard weights and measures, weighing and measuring instruments authorised under the Bombay Weights and Measures Act, 1932, in districts or areas in which Parts II, III, V and VI of that Act are in force or elsewhere other than " shall be inserted

8 *Amendment of section 7 of Act XII of 1925*—In sub section (1) of section 7 of the said Act, after the words "for the purpose of sections " insert the figures and letters "3A, 3C"

9 *Insertion of new section 11A in Act XII of 1925*—After section 11 of the said Act the following new section shall be inserted, namely —

"11A. Power of Magistrate anything
contained in section 32 of t ency
Magistrate or a Magistrate of for
any offence punishable under ll be
deemed to have been amended accordingly

10. *Amendment of section 13 of Act XII of 1925*—(1) In section 13 of the said Act, after clause (a), the following clauses shall be inserted, namely —

"(aa) what shall constitute an admixture of cotton;

(ab) the period which shall from time to time constitute a season,

(ac) the authority by whom, the form in which, the conditions subject to which and the fees on payment of which, a licence may be granted under sub section (1) of section 2 A,

(ad) the particulars of the cotton ginning factory to be entered in the register maintained under sub section (2) of section 3,

(ae) the proportion of seed which may be contained in cotton;

(af) the person authorised to give a certificate regarding the quantity of moisture contained in any cotton and other matters specified in section 3-A,

(ag) the person authorised to examine bales under section 3 B,

(ah) the procedure for making a complaint and causing the contents of a bale to be examined and the fee for examination of the contents of a bale under sub section (1) of section 3 B,

(ai) the manner in which the things seized shall be sealed under section 3 C."

(2) Section 13 of the said Act shall be renumbered as sub section (1) of that section and after the sub section so renumbered, the following sub sections shall be added, namely —

"(2) The rules to be made under sub section (1) shall be subject to the condition of previous publication

Provided that when, in the opinion of the Local Government, such modification or rescission is likely to defeat or frustrate any of the purposes of this Act, the Local Government may, by notification in the local official *Gazette*, declare that the modification or rescission shall have no effect and thereupon the rule shall remain in force as if it had not been modified or rescinded "

11 *Addition of sections 16 and 17 in Act XII of 1925* —After section 15 of the said Act, the following sections shall be added namely —

16 *Penalty* —Whoever contravenes any of the provisions of this Act or any rule made thereunder

17 *Compounding off*
any person whose licence is
Act, or who is reasonably
a sum of money in lieu of
composition for the offence which may have been committed, as the case may be

(2) On payment by such person of such sum to the District Magistrate, such person if in custody shall be set at liberty and if criminal proceedings shall have been instituted against such person the composition shall be held to amount to an acquittal."

12 *Amendment of sections 3, 4, 6, 7, 8 and 9 of*
and (6) of section 3, in sub section (2) of section 4
sub section (3) of section 7, in sub section (2) of
section 9 of the said Act for the words 'shall be
conviction, be punishable " shall be substituted

APPENDIX VII.

As Passed by the Legislative Council
CENTRAL PROVINCES BILL No 33 Of 1935

THE COTTON GINNING AND PRESSING FACTORIES (CENTRAL PROVINCES
AMENDMENT) BILL 1935

*A Bill to amend the Cotton Ginning and Pressing Factories Act, 1925,
in its application to the Central Provinces*

Preamble—Whereas it is expedient to amend the Cotton Ginning and Pressing Factories Act, 1925, in its application to the Central Provinces in the manner hereinafter appearing.

And whereas the previous sanction of the Governor General required under sub section (3) of section 80 A of the Government of India Act has been obtained to the passing of this Act,

It is hereby enacted as follows —

1 *Short title and commencement*—(1) This Act may be called the Cotton Ginning and Pressing Factories (Central Provinces Amendment) Act 1935

(2) It shall come into force on such date as the Local Government may by notification appoint in this behalf

1 A *Amendment of section 2 of Act XII of 1925*—In section 2 of the Cotton Ginning and Pressing Factories Act, 1925 (hereinafter referred to as the said Act)—

(i) after the word, comma and dash context — the following shall be inserted, namely —

(aa) admixture of cotton means a prescribed mixture of different varieties of cotton

(ii) after clause (f) the following clause shall be inserted, namely —

(ff) licence means a licence granted under section 2 A

(iii) after clause (h), the following clause shall be inserted, namely —

(i) season means such period as may from time to time be prescribed

2 *Insertion of section 2 A in Act XII of 1925*—After section 2 of the said Act, the following section shall be inserted, namely —

2 A *Licence for working cotton ginning factory or cotton pressing factory*—
(1) No cotton ginning factory or cotton pressing factory shall be worked without a licence granted to the owner thereof by such authority, in such form, subject to such conditions and on payment of such fee as may be prescribed

(2) Whoever contravenes the provision of sub-section (1) shall be punishable with fine which may extend to five hundred rupees or, if he has previously been convicted of an offence under sub-section (1) to fifteen hundred rupees.

(3) No licence for which the prescribed fee has been paid shall be refused suspended or cancelled except on the ground that the owner or person in charge of the factory concerned has been convicted for the contravention of the provisions of section 3 A "

Provided that no licence shall be suspended or cancelled under this sub section until after the expiration of the season in which the said owner or person has been so convicted

2 A *Amendment of section 3 of Act XII of 1925*—In sub section (2) of section 3 of the said Act—

(1) the word ' and ' shall be omitted, and

(2) the following words shall be added at the end, namely —

" and the prescribed particulars as supplied by such person of the cotton ginning factory where it has been ginned."

3 *Insertion of sections 3 A, 3 B and 3 C in Act XII of 1925*—After section 3 of the said Act, the following sections shall be inserted, namely —

' 3 A *Prohibition against watering, etc., of cotton*—(1) The Local Government may by notification, declare that in any area specified in such notification no cotton which is ginned or pressed in a cotton ginning or cotton pressing factory shall contain any admixture of cotton

(2) Any owner of a cotton ginning factory or any person in charge of such factory who knows or has reason to believe that any cotton ginned in such factory contains seed in excess of the prescribed proportion or contains any foreign substance shall, on conviction be punishable with fine which may extend to fifteen hundred rupees

(3) Any owner of a cotton pressing factory or any person in charge of such factory who knowing or having reason to believe that any cotton is watered or contains seed in excess of the prescribed proportion or contains any foreign substance, presses or allows such cotton to be pressed in such factory shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees

(4) Any owner of a cotton

(5) Any owner of cotton who knowingly waters any cotton which has been ginned and which is being or intended to be pressed in such factory or mixes seed or foreign substance in such cotton shall, on conviction, be punishable with fine which may extend to fifteen hundred rupees

be
The

3 B Examination of cotton, packages or bales—(1) The Local Government or any gazetted officer authorized by it in this behalf may on its or his own motion or on receipt of a complaint that there has been a contravention of the provisions of section 3 A in respect of any cotton, package or of any bale and in the case of a complaint, on payment of the prescribed fee by the complainant, cause such cotton or the contents of such package or bale to be examined by the prescribed person or body

(2) A certificate given by such person or body after examination of the contents of any bale under sub section (1) shall be admissible in evidence and be presumptive proof of the facts mentioned therein until the contrary is proved

3 C Entry and inspection—(1) The Local Government may authorize any gazetted officer to enter into and inspect, at any reasonable time, any cotton ginning or cotton pressing factory for the purpose of ascertaining whether there is any contravention therein of any of the provisions of this Act or of any rule made thereunder or of any of the conditions subject to which a licence has been granted in respect of such factory and to seize all things in respect of which an offence punishable under this Act appears to have been committed

(2) The owner or the person in charge of every cotton ginning or cotton pressing factory shall give every reasonable assistance to the inspecting officer in the performance of his duties under sub section (1)

(3) The owner or the person in charge of such factory shall, in every instance, be permitted to attend during the inspection and the things seized during such inspection shall be sealed in the prescribed manner

4 Amendment of section 5, Act XII of 1925—For section 5 of the said Act, the following section shall be substituted, namely—

"5 **Returns**—(1) The owner of every cotton ginning factory shall submit returns as may be prescribed in the manner as may be prescribed by the Governor General in Council, of the quantity of cotton ginned in the factory during the week ending on the last day of that week

(1 A) The Local Government shall compile from the weekly returns submitted in the manner as the Governor General in Council may direct, a statement showing the total number of bales pressed in the province during the week and from the commencement of the season to the end of the week to which the returns relate :

Provided that the quantity of cotton ginned in any individual factory shall not be published

(2) The owner of every cotton pressing factory shall submit to the prescribed form as may be prescribed by the Governor General in Council, of the quantity of cotton pressed during the preceding week and the end of that week, and the approximate quantity of cotton pressed during that week.

(3) The Local Government shall compile from the weekly returns submitted under sub section (2), and shall publish in such manner as the Governor General in Council may direct, a statement showing the total number of bales pressed in the province during the week and from the commencement of the season to the end of the week to which the returns relate :

5 *Addition of section 16, in Act XII of 1925*—After section 15 of the said Act, the following section shall be added, namely —

" 16 Whoever contravenes any of the provisions of this Act or any rule made thereunder or any of the conditions subject to which a licence has been granted to him shall, on conviction, if no other penalty is already provided in this Act for such contravention, be punishable with fine which may extend to five hundred rupees, or, if he has previously been convicted of an offence under this Act or any rule made thereunder, with fine which may extend to fifteen hundred rupees "

APPENDIX VIII.

THE UNITED PROVINCES COTTON PEST CONTROL BILL

A Bill to Provide for the Proper Treatment of Cotton Seed

Preamble—Whereas it is expedient to provide for the proper treatment of cotton the larva of the moth
 11 worm, and whereas
 under sub section (3)
 this Act, it is hereby

enacted as follows —

1 *Short title, extent and commencement*—(1) This Act may be called the Cotton Pest Control Act

(2) It extends to the whole of the United Provinces of Agra and Oudh

(3) It shall come into force on such date or dates and in such parts of the United Provinces as the Local Government may by notification in the *Gazette* from time to time direct

2 *Definitions*—In this Act, unless there is anything repugnant in the subject or context—

(a) "Controlled area" means any part of the United Provinces in which the Act is in force by virtue of a notification issued under sub section (3) of section 1,

(b) "Prescribed" means prescribed by or under rules framed under this Act,

(c) "Raw cotton" means the unginned bolls of the cotton plant,

(d) "Seed" means the seed of the cotton plant,

(e) "Hand ginning" means ginning by means of apparatus operated by human power,

(f) "Treat" with its grammatical variations and cognate expressions means to subject seed to a prescribed process for the purpose of freeing it from infection by a pest

3 *Ginning of raw cotton*—In any controlled area every owner of raw cotton whether produced in or imported into that area, shall cause it to be ginned before such date as shall be prescribed being not later than the sixteenth day of March next following such production or importation

Provided that a date not later than the first day of April may be prescribed as the latest date by which such raw cotton may be hand ginned

4 *Treatment of seed*—Subject to the provisions of section 8 every owner of seed in any controlled area whether such seed has been produced in or imported into that area and every person who has undertaken the ginning of any raw cotton on behalf of another shall before a date which shall be prescribed, being not later than seven days after the prescribed date first referred to in section 3 cause such seed to be treated by such method as shall be prescribed

Provided that for the purpose of treatment of seed by exposure to the heat of the sun the date prescribed shall be not earlier than the first day of April nor later than the fifteenth day of May

5 *Prohibition against disposal of untreated seed*—No person shall sell or otherwise dispose of any seed which has not been treated in the prescribed manner.

Provided that untreated hand sown seed may be sold or otherwise disposed of between the 1st day of October in any year and the 15th day of March next following

6 *Prohibition against sowing of untreated seed*—No person shall sow or cause to be sown any seed which has not been treated in accordance with the provisions of section 4

8 *Import of seed into controlled area*—(1) No person shall import or cause to be imported any seed into a controlled area except by railway and in closed waggons and except in accordance with the terms of a licence issued under this Act

Provided that this sub section shall not apply to seed conveyed by railway through such area in closed waggons and not unloaded at any place within the area except for the purposes of transshipment in the ordinary course of transit

and seed into a controlled
before its arrival within
place to be specified in
1 to the said place and

is imported into a controlled

(3) The treatment provided for by sub section (2) shall be completed—

(a) in the case of any seed imported after the fifteenth day of September in any year and on or before the prescribed date first referred to in section 3—within fourteen days of its arrival at the place specified in the licence, subject to the provision that the treatment shall be completed not later than *thirty* hours after the prescribed date aforesaid, and

(b) *thirty* hours after the prescribed date aforesaid, and not

9 *Export of raw cotton*—The Local Government may, from time to time, prohibit, during such periods as may be specified therein, the export of raw cotton from any controlled area, except in accordance with the terms of a licence issued under this Act

10 *Maintenance of registers*—Every person who undertakes the treatment of seed otherwise than by exposure to the heat of the sun shall maintain such records, registers and accounts as may be prescribed

11. *Appointment and powers of Inspectors*—(1) The Local Government may appoint such persons as it thinks fit to exercise all or any of the powers and perform all or any of the duties assigned to an inspector by this Act or by rules made thereunder

and may define the local limits within which such powers and duties may be exercised and performed

(2) An inspector may, subject to such rules as may be made in this behalf —

- (i) enter and inspect all places in which any business connected with the ginning or sale of raw cotton or the treatment or sale of seed is carried on,
- (ii) examine any machinery installed for the treatment of seed,
- (iii) examine any seed (before or after treatment) for the purpose of ascertaining whether it has been effectively treated
- (iv) examine any records or registers or accounts the maintenance of which is prescribed
- (v) enter and search without warrant any premises in which he has reason to believe that raw cotton or seed is being kept in contravention of this Act or the rules framed thereunder provided that no such entry and search shall be made except by, or under the written authority of, an inspector who is a gazetted officer,
- (vi) exercise such other powers as may be prescribed

12 *Penalties* —Whoever does any act or without reasonable cause omits to do anything in contravention of the provisions of any of sections 3 to 8 and 10 or of the orders issued under section 9 shall be liable on conviction before a Magistrate of the first class—

- (a) for a first offence or for a second offence in contravention of the same section—to a fine not exceeding two hundred rupees and
- (b) for a third or subsequent offence in contravention of the same section—to a fine not exceeding five hundred rupees

Provided that when any person is convicted of a first offence in contravention of any of the said sections the Magistrate may instead of sentencing him to a fine release him after admonition

13 *Orders by Magistrate for disposal of raw cotton or seed in respect of which an offence has been committed*—(1) Whenever any person has been convicted of an offence consisting of an act or omission in contravention of—

- (a) Section 3
- (b) Section 4
- (c) Section 6 or
- (d) Sections 7 or 8

The Magistrate at the time of passing sentence or of releasing the offender after admonition shall also pass an order directing the offender—

in case of (a) as aforesaid to cause the raw cotton in respect of which the offence has been committed to be ginned and the seed so obtained to be treated within such time as shall be specified in the order,

in case of (b) as aforesaid either to cause the seed in respect of which the offence has been committed to be treated within such time as shall be specified in

the order or to cause it to be removed from the controlled area concerned within twenty four hours,

in case of (c) as aforesaid, to cause the land in respect of which the offence has been committed to be ploughed over within such time as shall be specified in the order, or

in case of (d) as aforesaid, to cause the raw cotton or seed in respect of which the offence has been committed to be removed from the controlled area concerned within twenty four hours,

(2) If the offender has failed to comply with the order passed by the Magistrate under sub section (1) within the time specified, the Magistrate may, at his discretion, in case of (a), (b) or (d) as aforesaid, cause the land to be ploughed over by him or by some other person whom he may think fit, and the cost of the ploughing shall be paid by the offender. In case of (c) as aforesaid, the Magistrate may cause the land to be ploughed over by him or by some other person whom he may think fit, and the cost of the ploughing shall be paid by the offender.

14 *Power to make rules*—(1) The Local Government shall make rules consistent with this Act in respect of the following matters, namely—

(a) the fixing of dates by which raw cotton shall be ginned, the authorities by which such dates shall be fixed and the manner in which they shall be published,

(b) the fixing of dates by which seed shall be treated, the authorities by which such dates shall be fixed and the manner in which they shall be published and

(c) the methods by and the manner in which seed shall be treated.

(2) The Local Government may make such rules in respect of other matters as may be necessary for the purpose of carrying into effect the provisions of this Act.

(3) In particular and without prejudice to the generality of the power conferred by sub section (2) such rules may provide for—

(a) the conditions on and circumstances in which an area may be declared to be

(b) the

(c)

(d) prescribing the authority by whom and the manner in which a licence may be issued for the export of raw cotton from a controlled area,

(e) the maintenance of records, registers and accounts according to the provisions of section 10,

(f) the appointment of inspectors and the exercise by them of the powers conferred by section 11 and the conferring on them of such other powers as may be necessary for the purpose of this Act,

(g) the empowering of officers to carry out the orders of a court under sub section (2) of section 13 and the manner in which such orders shall be carried out, and

(h) the delegation of its powers by the Local Government.

(4) All rules made under this section shall be subject to the condition of previous publication

(5) All such rules shall be published in the *Government Gazette* and shall, unless some later date is appointed, come into force on the date of such publication

16 *Protection to persons acting under this Act*—No suit, prosecution or other legal proceeding shall lie against any person for anything which is in good faith done or intended to be done under this Act

STATEMENT OF OBJECTS AND REASONS

The cotton crop of the United Provinces is subject to attack by the caterpillar of the moth *Platyedra gossypiella* Saund, commonly known as the Pink Boll worm of cotton. The larva is carried over from season to season in cotton seeds which the caterpillar hollows out and in which it lies dormant until the favourable conditions produced by the monsoon bring forth the moth, the latter lays its eggs on the cotton plant and the larvæ when they emerge find their way into the cotton buds or bolls.

2 This pest destroys upwards of 25 per cent of the crop in normal years and in some years reduces the return to the grower by half, the normal loss to the cultivator is estimated at from Rs 10 to Rs 15 per acre. Further, the intensity of this infestation coincides with the period of development of most of the bolls in varieties of cotton of greater lint length and better spinning quality, thus preventing the profitable growth of better varieties in the province. It is therefore necessary to control the pink boll worm pest to enable cotton to be more extensively and profitably grown.

3 As a result of continued research it has been ascertained that the treatment of all cotton seed by heating it to an appropriate temperature diminishes the attacks of this pest, with consequent increase in yield. It is possible to deal with small village stocks by exposing cotton seed to the heat of the sun for two hours in April and May. But other methods are also available for the treatment of large quantities of seed. Heating

of the cotton industry in the province

J P SRIVASTAVA,
Minister for Education

NOTES ON CLAUSES

Clause 3—Experience has shown that unginned cotton cannot be conveniently or satisfactorily treated, accordingly it is proposed that ginning should be completed by a particular date so that the seed may be effectively treated at the proper time. The exact date would vary according to the season and locality and the variety of cotton grown.

and it is therefore proposed to leave the notification of this date to be prescribed by rules and only to mention the latest date in the Act itself.

Clause 4.—It is necessary that all seed within a controlled area should be treated in such manner as to prevent any possibility of its serving as a source of reinfestation of the new crop. It is also necessary that the treatment should not damage the seed.

It is proposed to leave the method of treatment to be determined under the rules of the Act. At present the most satisfactory known methods of treatment are by sun heat or by steam heating apparatus. Future research in India or elsewhere may however discover other and more economical methods, e.g. electrical treatment. A greater degree of flexibility is attained in the choice of methods if the matter is left to be decided by rule than if specific reference is incorporated in the Act itself. Moreover, it will then be easier to allow discretion to factories to put up such heaters as they think suitable, provided they comply with the requirements of the rules.

It is necessary to fix a final date for the treatment of seed to ensure that there shall be no serious danger of reinfestation of the planted crop through the emergence of moths from untreated stocks. Periods of moist heat, such as occasionally occur from April onwards stimulate the emergence of the adult insects. It is therefore proposed to provide for such fixation of date as would combine the maximum of protection compatible with practicable treatment.

Sun heat is generally not strong enough for seed treatment before April. April 1, is therefore proposed as the earliest date to be notified for such treatment. It would be desirable that all seed should be treated before April 15, if this may not be practicable. . . . the purpose. In practice to . . . under the rules, the main . . . or irrigation. In any case . . .

In normal practice factory ginned seed would be treated within a few hours of ginning. A margin of seven days is suggested to safeguard ginneries in the event of their seed treatment being in arrears of their ginning. It is intended that the date actually . . . will be determined to suit . . .

Clause 5.—It is essential to the smooth working of any scheme of control that no stocks of . . . should be allowed to issue from the ginnery . . . only be determined by . . . officers and . . . There is . . . no danger of the . . .

Clause 6.—The sowing of untreated seed has to be prohibited if the pest is to be brought under control.

Clause 7.—The importation of raw cotton after the close of the factory ginning season would be a serious menace, and has no commercial justification. If required to augment the seed supply, the necessary seed can be imported as such.

Clause 8.—It is necessary to preclude reinfestation of a controlled area by the introduction of infested seed. It is therefore proposed that control should take the form of licence to import, which will be issued by the Collector or other officers to whom powers have been delegated for the purpose.

Seed certified to have been treated in another controlled area will be under no restrictions. Untreated seed must be treated effectively and reasonably quickly and there must be adequate safeguards against reinfection prior to treatment. These requirements are met by permitting import by rail only, and to places in which treatment facilities are available and have been arranged for by the importer, by importing in sound bags, and by limiting the time the seed may be held pending treatment.

Importation of untreated seed by road has to be absolutely prohibited. The dangers of reinfection from such a source are obvious, both by escapes during transit and by possible leakages *en route*.

Clause 9—It has been urged on behalf of ginners that if they have to bear the cost of the treatment of cotton seed they can only do so by increasing their ginning charges. The latter may result in cultivators taking their raw cotton outside the controlled area for ginning purposes. Accordingly, it is provided that the Local Government may by order prohibit the export of raw cotton from the controlled area, except under licence during such periods as may be specified. Normal trade relations will not thus be affected.

Clause 10—It is necessary that all persons who engage in power ginning of *kapas* should maintain sufficient records of the *kapas* received for ginning, of the treatment of the same, and of the *kapas* sent to the market, so that a check to be maintained records is included in the Cotton only applies to such ginning maintenance of such records as

may be necessary has to be provided for

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APPENDIX IX.

PROGRESS IN THE INTRODUCTION OF IMPROVED VARIETIES OF COTTON

Boxsar—Broach Tract.—The group which was taken up last year within the policy of growing so called Selection I A A.L.F. during the previous year as a result of damage due to frost; this group was accordingly excluded from the Departmental supervision during 1935-36 as a result of which the controlled area was reduced from 23,751 acres to 12,826

Out of 1,055,411 lbs of 1027 A L F seed purchased last season 289,616 lbs were supplied to Chiketa Ud-pur and the remaining 765,795 lbs were distributed from 20 depots in the Surat tract. Besides, the Hansot Co-operative Cotton Sale Society supplied 32,495 lbs. seed direct to its members, the total quantity of seed distributed thus being 1,118,906 lbs. The Rajpipla and Baroda States obtained their requirements of seed locally.

DECCAN—Ahmednagar District. Of the total area of 188,635 acres under cotton in this district the Department and Jethes

under *Banilla* cotton was 9,300

cotton in the Deccan Canals, this was the year

by the

of lint per acre

A seed distribution scheme of the Indian Central Cotton Committee is in the progress in this district and under it a total area of about 20,000 acres was organised for the multiplication of pure seed and 825,000 lbs. of seed were stocked for distribution in the coming season. *Banilla* cotton has been found to give higher yield and to be of better quality in the black soils of the Tapi belt than in the lighter types of soils.

KUMTA—Dharmar Tract.—The work of introducing two improved varieties of cotton, viz., *Jayawant* and *Gadag No. 1*, was carried out on an extensive scale through the Hubli and Gadag Cotton Sale Societies, with the aid of funds provided by the Indian Central Cotton Committee. The reserved area maintained for multiplying pure seed free

seed of *Jayawant* cotton at the Hubli centre — against 1935-36 and that of *Gadag No. 1* at the Gadag centre — against 1935-36 the previous year. The quantity of seed distributed was 1,281,670 lbs of *Jayawant* and 1,281,670 lbs of *Gadag No. 1*, during 1935-36.

For distribution of general pedigree seed stocked by the Co-operative Cotton Sale Societies, seed depôts were opened as usual in different selected centres. The general area grown with pure seed was 118,423 acres for *Jayawant* cotton as against 126,286 acres last year, and 58,434 acres for *Gadag No. 1* cotton against 65,238 in the previous year. The estimated yield of *Jayawant* was 13,020 bales as against 15,000 bales last year, and 7,800 bales of *Gadag No. 1*, as against 4,600 bales in the previous year.

The Hubli Sale Society also sent outside its area of operation 590,100 lbs of *Jayawant* seed enough for 59,010 acres. The total area under pure seed of *Jayawant* therefore, 177,433 acres as against 191,336 acres last year. The quantity of seed distributed was 81,163 lbs of *Gadag No. 1* seed, enough for 8,116 acres. The total area under *Gadag No. 1*, therefore, 67,549 acres as against 74,352 acres last year.

With a view to spread *Jayawant* cotton in other areas, separate seed multiplication blocks of 5,847 acres at the Athani centre, 933 acres at Bailhongal and 500 acres at Bagalkot were organised. 476,000 lbs of pedigree seed, enough for 47,600 acres, have been stocked for distribution during 1935-36.

Jayawant cotton

of seed cotton (1,344 lbs) at the Athani centre the (1,344 lbs) over local

SIND—Three main classes of cotton have been found to be successful in Sind, viz., (a) *Sind deshi*, (b) *Sind American*, (c) Imported *Egyptian* and *Sea Island* cottons.

Among each of these three main classes the Department of Agriculture in Sind has, by botanical selection, evolved improved strains which on account of better yield, high ginning outturn or superior quality, are suitable for extension in general cultivation in the different cotton growing tracts of the Barrage areas.

Sind Deshi Cotton—This cotton has a special market of its own in the Sind and is highly valued for its bright colour and fine texture.

Sind American Cotton—This cotton has been evolved from the *Sea Island* and *Egyptian* cottons. It has been found to be superior to the *Sind Deshi* cotton in its ginning outturn and has a special market of its own in the Sind and is highly valued for its bright colour and fine texture. The total area under *deshi* cotton in 1935-36 was 463,834 acres (including Khairpur State) with an estimated outturn of 189,800 bales of cotton.

Sind American Cotton—This cotton occupied in 1935-36 about 378,075 acres out of the total cotton area of 841,909 acres. It has been evolved from the *Sea Island* and *Egyptian* cottons, but as the latter two are not so well adapted to the Sind climate and are attacked by the Agave and other pests, the *Sind American* cotton is definitely superior to them. It has been evolved from the *Sea Island* and *Egyptian* cottons, but as the latter two are not so well adapted to the Sind climate and are attacked by the Agave and other pests, the *Sind American* cotton is definitely superior to them.

Sind American 4F 98—This cotton has a staple length of $\frac{1}{4}$ " to $\frac{15}{16}$ " and spins 34's counts; it gives a high yield and has a ginning outturn of 33 per cent. This strain

forms the bulk of the crop in the new cotton growing areas on the Right Bank of the Indus where it has been found to be the most suitable type for cultivation.

Sind Sudhar (259F 1) — This improved strain has a staple of $1\frac{1}{10}$ long and spins 40 s. It has a ginning percentage of 29.30 and in normal years is a very high yielder. It is resistant to attack and can withstand as the being

The economic side of the question, which is of primary importance to the grower depends largely upon the prices prevailing for the various types of cotton. During 1935 36 these cottons were sold in large quantities both in Karachi and Bombay at the following rates —

SALE OF COTTON LINT IN 1935 36

	Price per candy of 784 lbs	Premium over Broach			REMARKS
	Rs a p	Rs a p	Rs	Rs	
<i>SIND N R (27 W N)</i>	174 8 3				Karachi delivery
<i>SIND AMERICAN —</i>					
4F 98	206 10 10	19 10 10 on	187		
285F 2	226 15 0	39 15 0 on	187		Bombay delivery
<i>Sind Sudhar</i>	267 0 0	80 0 0 on	187		
<i>SIND EGYPTIAN AND SEA ISLAND —</i>					
<i>Boss III 16</i>	337 0 0	150 0 0 on	187		"
<i>Sea Island 2 4</i>	337 0 0	150 0 0 on	187		"

For successful cultivation of long stapled and fine quality cottons it is necessary to evolve a reliable marketing organization which will secure adequate premium for quality from the trade. Indian mills have of late shown considerable interest in these long stapled cottons and in order to ensure future supplies it is for them to encourage their production by offering the requisite premiums. The growers of Sind American cotton, as also the spinners are in constant fear of not getting an adequate price for staple cotton marketed in pure conditions.

MADRAS — I. The Southern Tract — (A) Cambodia — Coimbatore — (i) The multiplication of pure Co 2 Cambodia cotton seed for distribution to cultivators continued as usual through the annual contract of seed farms with co-operative seed societies and

year.

(u) P
operative
152 000 0

scope for

(ui) *Cambodia-Trichinopoly*.—In the Trichinopoly District 59,089 lbs of Co 2 *Cambodia* seed were distributed to the *ryots* by the Agricultural Department, as against 21,700 lbs distributed in the previous year. The area covered by this variety during the year was 6,090 acres

(iv) *Cambodia-Madura*.—The area under *Cambodia* seed farms (Co. 2, 920 and 1267) was 172 acres in 1934-35.

42,031 acres

(B) *Karunganni-Coimbatore*.—(1) The multiplication of C.7 *Karunganni* strain of Tinnevely tract which has become popular in the Coimbatore District was continued through seed farms in the district.

Karunganni-South.—(i) The area under *Karunganni* strains C.7, A.10 and KPT. 1 seed farms was 1,909 acres in 1934-35, as against 1,220 acres in 1933-34. (Strain No. 1)

(u) In the Trichinopoly District, 3,270 lbs. of C.7 *Karunganni* seeds were distributed to the *ryots*, about 695 acres were sown to this cotton.

II. NORTHERNS AND WESTERNS TRACT.—A. *Northerns*.—(N. 14).—The seed farms under N 14 variety were again started at the instance of Messrs Binny & Co, on an area of about 90 acres distributed in the *talugs* of Nandyal, Koilkuntla and Sirvel of the Kurnool District where this variety was reported to thrive better than in other *talugs* in the tract. The average yield of *kapas* per acre during 1935-36 was 200 lbs. as compared to an exceptionally good yield of 350 lbs during 1934-35. The premium paid by Messrs. Binny & Co this year was Rs 30 per *candy* of 500 lbs. against Rs 10 to Rs. 15 in the

previous year. There is now on hand a stock of seed sufficient to sow about 1,000 acres during the next sowing season. The area of natural spread under this variety is reported to be about 2,280 acres.

B. Westerns—H 1 strain—The seed farm during 1935-36 was concentrated in nine villages round about Guntakal and consisted of 3,280 acres against an area of 3,588 acres during the previous year. Due to adverse seasonal conditions and consequent low

Central Provinces and Berar—The outstanding feature of the year was the growth of the other Grown

Central Provinces—C 402—Over 1,400 acres of this strain were grown with

C 402 combines improved fibre quality with high ginning percentage and is regarded by the local mills as superior to *Broach*.

C 520—This selection continues to spread on account of its early maturity, high yield and high ginning percentage, the fibre properties are much superior to the average *Bengals*.

PUNJAB—(i) The total area under American cotton in British districts was 1,305,500 acres, of which 4 F was grown on 1,118,900 acres and 289 F on 64,600 acres. 43 F, a new early maturing cotton recently evolved by the Cotton Research Botanist, was grown on an area of 6,000 acres; it is estimated that the area under this cotton will rise to over 25,000 acres during 1936-37.

Province (excluding Indian the greater proportion

(i) **4 F**—This is a new variety and has all the desirable character of the plant is very sturdy of this

(ii) **Desi Cotton**—With a view to improve the length of lint of *Desi* cotton, 15 *Mollison* was crossed in 1930 with *Million Dollar*, a Chinese cotton with medium lint. Successive hybrid generations were critically examined to find out a suitable combination of desirable characters in one plant, and as a result a variety called "Jubilee Cotton" has been evolved which resembles *Mollison* in outward appearance, but has a much superior lint. A comparison between the spinning performance of 4 F "Jubilee Cotton" and *Mollison* showed that 4 F can spin on the average 21 s, ordinary *Mollison* 6 s to 8 s.

and "Jubilee Cotton" from 16's to 18's Messrs. E. D. Sassoon & Co., Bombay, who spun a bale of this cotton and made it into sheeting cloth expressed themselves highly satisfied with its performance both on the spindle and on the loom.

BURMA—The total area under improved crop gave an average ginning outturn of 38 *Wagale*. The total quantity of *lapas* of the Central Farm ginnery was 111,771 *vis*, and distribution

As a result of experiments conducted at Mahlaing Central Farm

was decided to multiply these two strains in separate tracts

the
y is
of
port

(2) *Rajpipla* cotton (known by the name of *Rajpipla*) is a variety of this variety t output o pulsory quality c

BARODA STATE.—(1) *Nasars District*.—An area of about 75,000 acres is now under fairly pure 1027 *A.L.F.* seed. The Goghari Cotton Control Act came into force in the district from the 25th April 1936.

(2) *Baroda District*.—Extension of *B 9* cotton in the district in areas where wilt was not much in evidence was in progress and the seed of *B 9* cotton supplied in the district amounted to 14,480 lbs sufficient to cover 1,448 acres.

(3) *Mehsana District*.—Attempts are being made to introduce *Wagad No. 8* in place of local *Wagad* but lack of pure seed in sufficient quantity has hindered effective progress.

(4) *Amreli District*.—*Dhulia* cotton of which a good deal was hoped for on the basis of earlier trials on the farm has not, on the whole, come up to expectations. Its weakness lies in the marked tendency to shed its bolls heavily under certain moisture conditions in late September or early October. Some recovery of this loss is possible in irrigated areas but not when sown, as is most of the cotton, under dry conditions.

Some growers, however, continue to grow it on account of its higher ginning percentage. Trials of other types are being pushed forward. The correct solution is a cotton breeding station for Kathiawar and this, it is expected, will be brought into existence next year at Amreli in the Indian Central Cotton Committee's *Dholleras* Cotton Improvement Scheme.

Hyderabad Sales. (1) *Channa* seed 482,071 lbs of *Channa* seed 63 lbs of
 ar
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 sufficient for about 1,479 acres

(2) *Aurangabad District*—Distribution of *Banilla* seed was continued, with a view to replace the inferior mixture now grown in the district 115,000 lbs of seed sufficient for about 7,200 acres were distributed by the Agricultural Department on *Takavi* system

(3) *Parbhani District*—Distribution of seed of *Perum 262* was continued, with the object of replacing the present inferior variety 40,000 lbs of seed sufficient for about 2,500 acres were distributed by the Agricultural Department on *Takavi* system

(4) *Behar District*—Distribution of seed of more advanced or resistant with a view of *Jaya*
 of *Goda*
 on *Takavi* system

APPENDIX X.

BALANCE SHEET AS AT 31st MARCH 1936

RECEIPTS	Rs.	a.	p.	Rs.	a.	p.	EXPENDITURE	Rs.	a.	p.	Rs.	a.	p.
Cotton Cess Receipts	16 18	181	13 1	1 05,24	795	6 81	A Administration				16 70	773	6 5
Interest received on investments							B Improvement of Cotton Marketing—				88 977	5	5
444—Refund of income tax deducted from interest	18,072	13	0				1 Cost of exhibits, moisture tests, etc.	1 95	140	12 6			
	16,34	254	10 1				2 Cost of growing cotton in India				284	118	1 11
Less—Interest paid in advance at the time of purchasing Government Paper (since recovered) interest on temporary overdraft and Bank's commission for collection of interest	56 947	9	2				C. Seed Distribution & Extension Schemes—						
Interest credited to Provident Fund account	4 886	6	2				(i) Bombay Presidency—						
Bank's withdrawal charges for Securities sold	4 327	11	0				(1) Hubli	42,524	13	10			
Income tax on interest	20 153	3	6				(2) Gadag	41 045	2	7			
Brokerage for securities sold	816	2	0				(3) Gadag Supplementary	70 167	11	4			
Provision for Sinking Fund	7 035	0	0				(4) Surat	46 431	10	4			
	93,470	15	10				(5) Athani	18 925	15	8			
Profit on conversion and sale of Securities							(6) Khandish	1 59 727	9	0			
Sinking Fund account				15 40	783	10 3	(7) Deccan Canals (Banilla)	3 721	12	7			
Miscellaneous Receipts				2 50	439	10 2	(8) B D (8)	1 065	0	0			
Refund from Provident Fund account for contributions disallowed				7 035	0	0	(*) Madras—						
Suspense Receipts				40 802	6	5	(1) Pay and allowance of Business Manager Truppur	18 610	3	9			
Less—Payment made	148 10	0		3 391	1	11	(2) Co 2	25 762	3	2			
	68 5	9					(3) H1	3 952	2	9			
Carried over							(iv) Sind	1 90 666	0	11			
							(v) Hyderabad	30 056	12	1			
							(vi) Central Provinces—						
							Extension of long staple Cotton & marketing of Verum cotton	1 45 440	11	5			
							(vii) Baroda	5 755	12	5			
							(viii) Lyallpur gunnery	16 033	3	3			
							(ix) United Provinces C 402	6,660	0	0			
							Carried over				7 76	611	13 1
											27 31	503	5 5

BALANCE SHEET AS AT 31st MARCH 1936—*contd*

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Receipts.	Rs. L. P.		Expenditure		Rs. L. P.		Rs. L. P.	
	Rs.	L. P.			Rs.	L. P.	Rs.	L. P.
Brought forward	1 23 67	347 7 8					27 31	603 5 8
			D Printing and Propaganda—					
			(1) Publicity and Propaganda		82 447	9 8		
			(2) Printing and Distribution		43 230	8 0		
			E Statistical Research—				1 25	678 1 5
			(1) Studies of villages consumption of cotton		21 522	9 9		
			(2) Forecast Improvement Scheme		9 182	15 9		
			II Technological Research—				30	705 9 8
			1 Technological Laboratory—					
			A. Capital Expenditure —		4 06	298 7 0		
			1 Land and Buildings		96 690	6 10		
			2 Machinery		7 502	2 8		
			3 Freight		41 558	3 7		
			4 Apparatus and Equipment		5 789	8 3		
			5 Machinery workshop		16 84	064 0 8		
			B Working Expenses		81 933	7 8		
			2 Provincial		235	7 11	23	24 059 11 9
			3 Development of alternative uses for Indian cottons					
			III Research Studentships		2 49	034 8 9		
			Less—Amount recovered from Mr. Tas-kbir Ahmad		49	12 0	2	48 984 12 9
Carried over	1 23 67	347 7 8	Carried over				54	60 931 8 10

BALANCE SHEET AS AT 31st MARCH 1936—contd

Receipts	Rs. a p	EXPENDITURE	Rs. a p	Rs. a p
Brought forward	1 23 67 347 7 6	Brought forward		54 60 931 8 10
		IV AGRICULTURAL RESEARCH GRANTS—		
		urist Physiological Writing up	2 45 139 11 8	
		Bollworm	5 814 7 8	
		Bollworm Propaganda	1 14 509 8 7	
		Bollworm Writing-up	91 468 9 2	
		Charwar Wilt	2 315 3 0	
		Writing up	1 82 836 4 11	
		Detection of Cotton Research on Cotton Breeding	10 902 10 3	
		Leaf Disease Survey	28 573 5 0	
		y of Goghari cotton in Bombay Presidency	31 749 7 6	
		ration of cotton seed in Bombay Presidency	31 116 6 3	
		Fuller Propaganda	38 988 0 11	
			3 938 8 6	
			1 380 0 0	
			4 715 0 0	
			5 289 0 0	
			1 12 361 2 8	
			88 014 1 1	
			14 565 10 10	
			7 018 2 5	
			4 73 058 15 4	
			1 88 643 10 1	
			46 671 3 2	
			18 972 2 3	
			10 812 11 3	
			6 872 10 0	
			1 730 10 6	
			32 667 8 0	
Carried over	1,23 67 347 7 8	Carried over	17 64 524 12 7	54 60 931 8 10

BALANCE SHEET AS AT 31st MARCH 1936

Provident Fund Account

—	Rs. a p	Rs. a p	—	Rs. a p	Rs. a p
Subscribers contributions % Less—Payments made to subscribers resigned	1 96 693 8 1 45 952 13 4		By advances to subscribers Less—Recoveries made upto 31st March 1936	36 196 2 0 32 617 10 0	
Committee's contributions % Less—Payments made to subscribers resigned and forfeitures for contributions disallowed	1 92 383 3 6 43 657 5 2	1 50 740 10 9 1 48 725 14 4	Accrued interest on Government Paper upto 31st March 1936 credited to subscribers for distribution By Balance		3 578 8 0 3 424 8 4 3 34 381 4 4
Suspense Deposits of Mr. Dutta for his own contributions Suspense amount due to Deon Durbar Singh resigned	1 046 4 10 23 0 4				
Investment Fluctuations ^a Lapses and Forfeiture ^a		1 009 5 2 38 976 7 5 1 871 15 0			
Total		3 41 384 4 8	Total		3 41 384 4 8

STATEMENT OF RECEIPTS AND PAYMENTS FOR THE YEAR ENDED 31st MARCH 1936.

193

Receipts.	Ru. L. P.	Payments.	Ru. L. P.	Ru. L. P.
*Opening Balance	28,52 0 0	Administration of the Committee (including Improvement of Cotton Market, Seed Distribution and Extension Printing and Propaganda) and Statistical Research	2 18 02 13 0	4 39 197 13 0
*Other Receipts	6 82 678 0 1	Administrative Grants in Aid	8 08 403 0 10	4 76 232 12 9
Interest on Investments	2,08 0 2 10	Technological Research	25 044 0 0	2 26 108 8 4
	1,22 039 8	Closing Balance (Government Paper at cost) —		
*Includes Rs 3,246-2-0 on account of Sinking Fund and Rs 14,920-12-8 against Loans Recoverable from Fibre and Cotton Societies		44% Government of India Loan 1927-50 of the Face Value of Rs 2,75,000		
		44% Government of India Loan 1928-50 of the Face Value of Rs 2,75,000		
		5% Government of India Loan 1929-44 of the Face Value of Rs 2,09,000		
		5% Government of India Loan 1930-43 of the Face Value of Rs 3,60,000		
		6% Bombay Municipal Bonds 1934 of the Face Value of Rs 50,000		
		6% Karachi Port Trust Coupon Debentures 1935 of the Face Value of Rs 50,000		
		6% Rangoon Municipal Debentures 1934 of the Face Value of Rs 3,83,500		
		11% Indus Sterling Bearer Bonds of the Face Value of Rs 2,20,000		
		(Market Value on 31st March 1936 Rs 79,50,553 8 0)		
		Imperial Bank of India Current Account	24 72,196 2 2	
		Imperial Bank of India Current Account	34 991 13 2	
		Technological Laboratory as certified by the Secretary		
		Technological Laboratory as certified by the Director,		
		High Commissioner for India, London, for Scholar		
		ships (1100)	500 0 0	
		Director of Agriculture Bombay Presidency certified	1,335 10 5	
		by the Director of Agriculture Bombay Presidency		
		Plant Physiologist, Punjab, Certified by the Plant	1,295 0 0	
		Physiologist, Punjab		
		Publicity Department	100 0 0	
		Undisbursed pay of a manual who has resigned	50 0 0	
		Expenses (Recoverable)	14 8 0	
		Loans Recoverable (but considered doubtful)		
		47% Total Closing Balance	4 795 2 5	
			64 10 6	
			12 083 12 10	
		Total	25,24 131 9 1	
		Total	38 64 760 11 2	
		44% Government of India Loan 1926-70 of the Face Value of Rs 1,16,900 has been deposited with the Imperial Bank of India for security against any overdraft that may be required by the Com. Com.		
		This is in the Rs. 7,035 on account of provision for Sinking Fund		
		We have seen and the above Statement of Receipts and Payments of the Indian Central Cotton Committee with the Books Vouchers and Certified Returns of the Com. Com. have been obtained all the information and explanations we have required and certify that to the best of our information and explanations received, the above Statement is a correct abstract of the figures appearing in the books and is drawn up in conformity with the Rules under the Indian Cotton Com. Act 1923		
		Bombay 1st June 1936		

(Sd) J. B. Bhatnagar & Co
Registered Accountants, Auditor &c.

PROVIDENT FUND ACCOUNT AS AT 31st MARCH 1936

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Rs	a	p	Rs	a	p	Rs	a	p
To Opening Balance as on 1st April 1935			264 489 10			1 56 374 11		
Less — Payments made during the year for a subscriber who died in 1934			224 7 6			0		
Subscribers contributions			264 265 3 1			58 656 9 0		
Add — Recoveries against advances			4 920 14 0			27 760 0 0		
Less — Refunds to subscribers who have received advances to subscribers			2 97 540 1 1			30 593 8 0		
			5 722 14 6			18 243 12 0		
Advances to subscribers			4 264 15 0			2 151 7 0		
			10 007 13 6			34 601 5 4		
Committee's contribution received from Indian Central Cotton Committee at 100 per cent.			2 87 532 3 7					
			28 354 0 0					
Less — Payments to subscribers who have resigned including transfers to Lapse and Forfeiture Account for contributions disallowed			3 15 836 3 7					
Interest received on investments			5 655 3 6					
Refund of Income Tax deducted on interest received during 1934-35			10 431 13 4					
			158 12 4					
			107 5 0					
Less — Interest paid during the year to subscribers who have resigned			10 637 14 8					
On their own contributions			50 7 7					
On Committee's contributions			52 7 11					
Interest paid in advance at the time of purchase of Government Paper (since received)			744 0 5					
Income-tax deducted from interest on investments (non-recoverable)			250 10 5					
Bank's commission for collection of interest and cost of stamps			26 15 0					
Cost of stationery etc.			15 15 0					
			1 120 8 4					
Lapse and Forfeiture Account								
Investment Fluctuation Account								
Surplus Account (From Debitum Surplus due for Provident Fund)								
Total			9 34 381 4 4			9 34 381 4 4		

BOMBAY 16th June 1936

Examined and found correct

(Sd) S B BILLAMONIA & Co.,
Registered Accountants, Auditors

By Balance —
1. Securities to Government Paper at Market Price)
31% Government Promissory Notes of the face value of Rs. 1 60 800 0 0
31% Government of India Loan 1847 50 of the face value of Rs 55 500 0 0
5% Government of India Loan 1939-44 of the face value of Rs 25 600 0 0
4% Government of India Loan 1960-70 of the face value of Rs 32 600 0 0
61% Bombay Improvement Trust Loan 1937 of the face value of Rs 17 500 0 0
Savings Bank Account with the Imperial Bank of India
Current Account with the Bank of India

*Total Closing Balance

*Includes Rs. 1 048 4 10 being Suspense Deposit with interest thereon of Mr. Dutt's own contribution

Total

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1936

107

Major Head.	Total sanctioned grant.	Period	Date of starting of the scheme	Expenditure from Capital Grants on		Total expenditure upto 31st March 1936	Expenditure from annual grants on staff field experiments, apparatus and equipment of stores, laboratory and field centres permanent or semi permanent nature		Net working expenses of staff field experiments, labour stores, laboratory and field centres including petty apparatus	Remarks
				(a) Lands and Buildings	(b) Machinery, apparatus and other movable property		(a) Rs a p	(b) Rs a p		
1	2	3	4	5	6	7	8	9	10	
II Technical Research—										
(1) Technical Laboratory—										
(a) Capital expenditure	571,398 2 8		1923	557,826 12 4	4,08,256 7 0		1,50,223 9 9			
(b) Working expenses	17,08,584 13 7		Jan 1924	16,84,064 0 3	1,816 11 7		48,426 1 1	16,85,637 13 2		
(c) Provisional Working	8,151 0 0		April 1923	81,933 7 3	5,790 4 6		341 4 3	78,801 14 6		
(d) Development of alternate crops & local cottons	76,142 2 9									
(e) Development of alternate crops & local cottons	20,000 0 0			255 7 11				255 7 11		
III Agricultural Extension Schemes—										
(1) Local Physiological and Agronomy Schemes—										
(a) Local Physiological and Agronomy Schemes—	2,91,443 0 0	10 11	Sept 1923	2,50,954 2 11			25,334 5 2	2,27,619 13 9	(a) Physiological scheme closed down on 4th August 1932 and Writing up scheme on 17th October 1933	
(b) Local Physiological and Agronomy Schemes—	1,20,720 0 0	7 7	Sept 1923	1,14,509 9 7			4,767 8 7	1,09,802 1 0	Scheme closed down on 31st March 1931	
(c) Local Physiological and Agronomy Schemes—	2,420 0 0	0 4	July 1932	2,915 3 0				2,315 3 0	* This continuation scheme is financed from the savings of the Surat Clean up Scheme. The sanction of the Government of India to the extension of 2 years from 1st April 1937 is awaited	
(d) Local Physiological and Agronomy Schemes—	1,28,764 0 0	4 0	1st April 1931	91,468 9 2			10,828 0 11	80,640 8 3		
(e) Local Physiological and Agronomy Schemes—	18,010 0 0	2 0	1st April 1935	5,289 0 0				5,289 0 0		
(f) Local Physiological and Agronomy Schemes—	18,010 0 0	2 0	1st April 1937							
(g) Local Physiological and Agronomy Schemes—	2,63,448 0 0	8 11	Sept 1923	1,82,636 4 11			15,713 5 7	1,69,123 1 4	Schemes closed down on 31st July 1932 and in July 1929	
(h) Local Physiological and Agronomy Schemes—	11,255 0 0	0 10	1st June 1932	10,902 10 3				10,902 10 3	Scheme closed down on 31st March 1933	
(i) Local Physiological and Agronomy Schemes—	27,993 0 0	5 5 1/2	15th Oct 1929	28,573 5 0				28,573 5 0	Scheme closed down on 31st March 1932	
(j) Local Physiological and Agronomy Schemes—	45,000 0 0	5 —	1st April 1932	36,968 0 11			5,046 0 5	31,022 0 6		

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1936—contd

Major Heads	Total sanctioned grant.	Period	Date of starting of scheme	Total expenditure upto 31st March 1936	Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of permanent or semi permanent nature	Net working expenses, i.e. staff field experimenters, labourers, stores, laboratory and field contingencies including petty apparatus	REMARKS
					(a) Lands and Buildings	(b) Machinery apparatus and other movable property			
1	2	3	4	5	6	7	8	9	10
AGRICULTURAL RESEARCH GRANTS—(contd)									
IV Bombay Scheme—(contd)—									
(a) Jalgaon Cotton Breeding	41 111 0 0	5 0	1st April 1932	31 116 6 3	Rs a p	Rs a p	Rs a p	Rs a p	
(b) Coconuts of Cotton Research	23 694 0 0		Not to start	1 749 7 6			3 171 8 0	27 944 13 6	
(c) Survey of Small Leaf Disease of cotton	5 118 0 0	1 0	6th Nov 1933	3 038 9 6			495 2 6	1 749 7 6	
(d) Survey of Goghard cotton in Gujarat	5 000 0 0	5 0	16th Jan 1935	1 380 0 0				3 443 7 0	Scheme closed down on 31st October 1934
(e) Delamination of cotton seed — Recurring	5 250 0 0	3 0	1st Feb 1936	4 715 0 0		3 700 0 0		1 380 0 0	
	3 000 0 0							*1 015 0 0	*Provis onal figures
V Madras Scheme—									
(1) Herbaceous	1 47 088 0 0	14 6	Dec 1923	1 12 361 2 8			*4 420 10 3	*1 07 940 8 5	Do do
(2) Perennials and Physiological	2 12 779 0 0	7 0	16th Sept 1931	86 014 1 1			6 891 5 10	79 122 11 3	
(3) Fodder Crops —	900 0 0	6 5	14th Jan. 1931	14 565 10 10		881 11 7		13 352 3 9	
(4) Capital	21 010 0 0		14th June 1933	7 018 2 5				6 614 2 5	
(5) Recurring	15 730 0 0	5 0							
(6) Nallan Cotton Breeding									
VI Punjab Scheme—									
(1) Botanical —	31 330 0 0	14 71	13th August 1925	4 29 058 15 4	22 158 0 0	9 102 11 0	34 516 1 4	4 07 282 3 0	† Rs 2 030 transferred to Capital from work ing grant.
(2) Capital Expenditure	16 85 650 0 0								
(3) Working Expenses									
(7) Patonological —									
(a) Capital Expenditure	6 000 0 0								
(b) Working Expenses (Pink and Spotted Bugs)	2 40 410 0 0	10 11	4th May 1926	1 89 843 10 1		5 828 3 10	9 695 15 8	1 73 321 6 7	
(c) White Fly	56 087 0 0	5 5	1st May 1931	48 671 3 2			9 336 2 2	37 335 1 0	Scheme closed down on 30th September 1936.

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UP TO 31st MARCH 1936—*contd*

199

Major Heads.	Total sanctioned grant.	Period.	Date of start- ing of the scheme	Total expendi- ture upto 31st March 1936	Expenditure from Capital Grants on			Expenditure from annual grants on apparatus and equipment of a permanent or semi permanent nature	Net working expenses (i.e., staff, field experi- ments, labour stores, laboratory and field rental, petty apparat- us.	Remarks
					SCHEMES—contd					
					(a) Lands and Buildings	(b) Machinery & apparatus and other movable pro- perty	(c) Petty			
1	2	3	4	5	6	7	8	9	10	
VI. Punjab Schemes—(contd)										
(4) Root R.A.	42,208 0 0	6 0	1st Sept 1932	18,972 2 3	Rs a p	Rs a p	Rs a p	Rs a p	Rs a p	
(5) Spraying Trials	14,400 0 0	3 0	8th July 1933	10,512 11 3			181 4 0	18,790 13 6		
(6) Flycatcher	1,88,420 0 0	5 0	15th March 1935	32,867 8 0			3,025 13 3	7,486 14 0		
(7) <i>Indocalamus</i> and <i>Indocalamus</i> plants	1,000 0 0	2 0		6,872 10 0			3,559 2 0	29,308 6 0		
(a) Younging	6,700 0 0					5,872 10 0		1,000 0 0		
(b) In rearing	2,674 0 0	0 10	1st June 1934	1,730 10 6				1,730 10 6		Scheme closed down on 31st March 1935
(8) Survey of disease of <i>Indocalamus</i>										
VII. Central Provinces—										
(1) <i>Indocalamus</i>	41,000 0 0	2 6	Oct. 1923	3,84,607 3 5			4,853 7 10	3,79,753 11 8		*The balance of this amounting to Rs 5,100-15-8 layed on revision.
	5,26,150 0 0	15 0	1st April 1926							
(2) <i>Indocalamus</i>	4,773 0 0	2 0	2nd July 1934	6,023 15 0				6,023 15 0		Subject to the Govern- ment of India's sanction.
	15,013 0 0	1 3								
(3) <i>Indocalamus</i>	24,400 0 0	6 0	(d) July 1923	1,47,634 1 4		49,511 5 6		95,257 7 7		(d) Scheme closed down on 31st July 1931
	50,000 0 0		(e) 1st Oct. 1926							(e) Scheme closed down on 12th July 1934
(4) <i>Indocalamus</i>	44,475 0 0	7 9	1st July 1933	14,611 4 1			1,541 7 10	13,069 12 3		
(5) <i>Indocalamus</i>	19,400 0 0	3 8								
IX. Madras—										
(1) <i>Indocalamus</i>	1,72,83,515 12 10	Permanent	Oct. 1924	14,33,943 12 0	2,12,552 11 5	70,983 1 5		11,18,550 10 10		(1) Rs 50,202-12-10 transferred from Recurring grant to Capital.
(2) <i>Indocalamus</i>	11,50,417 15 0			2,21,563 0 5				19,093 2 0		
(3) <i>Indocalamus</i>	2,76,346 0 0	0 9	10th July 1927					2,02,471 14 5		

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1936—*contd*

Major Heads	Total sanctioned grant	Period	Date of starting of the scheme	Total expenditure upto 31st March 1936	Expenditure from Capital Grants on			Expenditure from annual grants on staff field expenses, apparatus and equipment of a permanent or semi permanent nature	Net working expenses, i.e. salaries, allowances, transport, laboratory and field contingencies including petty apparatus	REMARKS
					(a) Lands and Buildings	(b) Machinery apparatus and other moveable property	(c) Rs. a. p.			
		</								

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1936—contd

Major Head	Total sanctioned grant	Period	Date of starting of work	Expenditure from Capital Grants on		Expenditure from annual grants on staff field experiments apparatus and equipment of a permanent or semi permanent nature	Net working expenses i.e. salaries staff field experiments labour stores laboratory and field contingencies including petty expenses	Remarks
				(a) Lands and buildings	(b) Machinery apparatus and other movable property			
SEED SCHEMES								
	Rs. a. p.			Rs. a. p.	Rs. a. p.	Rs. a. p.	Rs. a. p.	
(a) Haveri	50 110 0 0	6 years	June 1930	42 504 13 10		5 14 0	42 518 13 10	Schemes closed down on 31st May 1936
(b) Gadag	54 545 0 0	6 "	June 1930	41 045 2 7			41 045 2 7	
(c) Gadag Supplementary	21 448 0 0	4 "	10th June 1931	20 167 11 4			17 238 5 10	Scheme closed down on 10th June 1935
(d) Haveri	27 752 0 0	5 "	5th April 1932	18 925 15 8			17 203 0 2	Not started
(e) Athani	48 757 0 0	5 "	1st April 1930	46 431 10 4		1 722 14 6	17 203 0 2	(a) Scheme closed on 31st May 1936
(f) Ballhonga	27 425 0 0	5 "	1st April 1930	46 431 10 4			48 431 10 4	Not started
(g) Borsat	84 050 0 0	5 "	1st May 1931	1 59 727 9 0				
(h) Khandesh	270 840 0 0	5 "						
	20 787 0 0	1 year						
(i) Dharwad	23 890 0 0	5 years	1st April 1934	3 721 12 7		5 4 0	3 718 8 7	Revised scheme sanctioned for one year only for the present from 1st June 1936 in which Hubli Gadag Athani Haveri and Ballhonga schemes have been merged and expenditure being met from the savings of those schemes and the Bombay Government contributing Rs 8 900
(j) B. D. B.	10 469 0 0	3 "	1st Dec 1935	1 065 0 0		23 3 0	1 041 13 0	
(k) Barwad Government seed			1st June 1936					
(l) Gadag No 1			1st June 1936					

STATEMENT SHOWING EXPENDITURE UNDER RESEARCH AND SEED EXTENSION SCHEMES UPTO 31st MARCH 1936—*contd.*

Major Items.	Total sanctioned grant.	Period.	Date of start- ing of work	SEED SCHEMES— <i>contd.</i>			Expenditure from Capital Grants on		Expenditure from annual grants on apparatus and equipment of permanent or semi-permanent nature	Net working expenses i.e., staff, field experiments, labour stores, laboratory and field contingencies including petty apparatus	REMARKS.
				2	3	4	5	6				7
									Rs	a	p
<i>Maharashtra</i> (a) Pay and Allowances of District Manager Thiruvur	21 050 0 0	5 years.	18th May 1931	18 640 3 9					148 8 0	18 491 11 9	Provisionally extended up to 14th September 1937
(a) Co. 2 (b) H. 1	81 310 0 0 16 860 0 0	5 2 "	15th Sept. 1932 6th May 1935	23 762 3 2 3 932 2 9					83 13 0	25 678 6 2 3 9 2 2 5	(b) Scheme closed down on 16th July 1934
Principal Lysolier Glimery Sind Hy. 2nd	18 125 0 0 3 89 540 0 0 35 466 0 0	8 years. 6 " & 6 months	1st April 1931 1st March 1930	16 038 3 3 1 50 666 0 11 30 088 12 1			9 221 5 0	6 616 14 2	5 780 3 9	1 84 885 13 2 30 086 12 1	Extension from 1st September 1936 to 28th February 1941 subject to the acceptance of the Committee's condition by the Hyderabad Government
General Provision— (1) Verma cotton	117 900 0 0	3 years & 8 months.	1st Sept 1930	73 544 2 5						73 544 2 5	Scheme closed down on 30th April 1934
(2) Extension of Long Staple cotton and Marketing of Verum cotton.	1 25 528 0 0 25 690 0 0 45 860 0 0	3 years 5 5	1st April 1934 16th April 1934 1st May 1935	71 894 9 0 5 755 12 5 6 660 0 0						* 217 8 0 300 0 0	* Provisional figures.

APPENDIX XI.

INDIAN RAW COTTON CONSUMED IN INDIAN MILLS

(Based on Returns made under the Indian Cotton Cess Act 1923 by Mills in British India and on Voluntary Returns from Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Nett)

	1923-24	1924-25	1925-26	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
British India	762,210	987,355	731,937	747,968	435,426	542,038	766,375	684,546	611,606	565,084	491,709	687,287	664,199
Assam & N.E.	202,745	273,639	298,800	264,139	298,075	318,983	344,021	321,503	322,257	348,009	373,345	326,558	320,982
British India	1,180,410	1,424,447	1,169,539	1,167,892	894,671	1,044,925	1,300,659	1,173,659	1,132,645	1,118,297	1,063,549	1,230,616	1,189,310
Madras Presidency	149,721	162,876	176,274	185,207	194,591	204,284	211,483	214,759	260,707	292,013	278,000	312,164	363,423
United Provinces	160,822	177,064	191,740	204,702	1,084,622	182,462	234,005	235,623	256,870	273,573	277,230	292,424	317,011
Central Provinces and Berar	84,635	106,052	109,095	111,292	118,888	121,391	123,146	118,492	115,018	111,008	112,660	125,014	130,268
Punjab	72,533	83,553	77,549	89,63	82,066	84,212	99,005	91,993	102,390	103,784	107,633	101,101	98,892
The Punjab and Delhi	23,898	30,663	35,394	40,687	45,638	54,575	64,464	73,736	89,681	80,854	71,939	83,897	89,430
Rest of British India	12,227	14,414	17,219	13,190	15,040	22,119	24,456	27,101	30,342	31,935	35,139	38,575	38,010
TOTAL—British India	1,893,438	2,099,069	1,798,204	1,812,733	1,519,769	1,714,038	2,037,695	1,935,363	1,987,603	2,009,664	1,946,210	2,183,791	2,228,374
TOTAL—Indian States*	142,505	178,600	187,614	209,443	251,589	277,540	315,999	333,996	358,793	351,060	380,116	428,341	449,198
TOTAL—India	1,835,943	2,177,678	1,985,818	2,042,176	1,771,349	1,991,578	2,353,694	2,269,359	2,346,396	2,360,724	2,326,326	2,612,132	2,677,572

* Figures for Indian States upto and including 1930-31, being based on yarn production returns, include foreign cotton also

INDIAN RAW COTTON CONSUMED IN MILLS IN INDIAN STATES

(Based on Voluntary Returns from or Yarn Production figures of Mills in Indian States)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Nett)

	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
Hyderabad	15 210	16 697	19 067	20 823	23 074	31 290	33 458	33 231	45 568	51 771
Mysore	43 571	44 320	59 819	46 580	43 596	49 593	30 536	47 168	51 196	50 708
Punjab	48 070	46 884	46 852	59 043	60 578	58 534	50 587	53 612	57 146	51 963
Gwalior	24 537	25 716	36 708	41 463	45 707	45 892	43 306	49 702	56 318	72 163
Indore	53 546	63 391	78 070	83 026	88 620	95 296	91 036	111 430	114 509	113 379
Kashmir States					20 283	18 849	18 868	26 506	3 438	37 397
Other Indian States	48 809	52 581	57 224	64 454	32 158	39 832	40 709	45 197	45 735	51 482
Pondicherry					18 350	20 257	23 170	23 610	22 691	20 355
Total Indian States	229 443	251 589	277 540	315 399	333 996	358 793	351 260	390 116	478 341	449 198

LOOSE (UNPRESS'D) INDIAN RAW COTTON RECEIVED IN SPINNING MILLS IN BRITISH INDIA

(Based on Voluntary Returns furnished by Mills)

Cotton Year 1st September to 31st August

(In Bales of 400 lbs Nett)

	1926-27	1927-28	1928-29	1929-30	1930-31	1931-32	1932-33	1933-34	1934-35	1935-36
Bombay Presidency	28 328	24 970	27 324	24 361	54 409	74 979	80 082	74 808	58 355	75 617
Madras Presidency	35 198	39 560	52 188	46 582	53 717	59 389	96 340	110 875	123 760	147 044
United Provinces	16 891	10 308	13 474	20 441	18 496	14 367	19 736	17 871	10 090	10 405
Central Provinces and Berar	40 762	20 681	6 924	16 243	15 771	20 743	17 462	18 362	20 544	27 502
The Punjab	3 910	4 739	3 760	4 361	4 507	2 317	2 149		1 535	3 110
Total	125 189	100 435	104 074	111 988	148 700	211 795	215 279	221 996	217 784	263 676

APPENDIX XII

STOCKS OF INDIAN RAW COTTON HELD IN INDIA BY THE MILLS
AND THE TRADE ON 31st AUGUST, 1935 AND 1936

(In thousand bales* of 400 lbs each)

Trade Descriptions of Cotton	TRADE STOCKS ON 31ST AUGUST								MILLS STOCKS ON 31ST AUGUST		Total Indian Trade and Mills Stocks on 31st Aug	
	Bombay Island		Karachi		Rest of India		Total India		Total India		1935	1936
	1935	1936	1935	1936	1935	1936	1935	1936	1935	1936		
BENGALS—												
United Provinces	—	—	—	—	(a) 9	(a) 4	9	4	23	16	32	20
Punjab	—	—	27	19	(b) 4	(b) 5	31	24	8	12	39	36
Sind	—	—	14	6	—	(c) 2	14	8	9	9	17	11
Rajputana	—	—	1	2	(c) 1	—	2	2	15	15	17	17
Others (Unclassified)	65	19	—	—	(c) 1	—	66	19	3	1	69	20
Total	65	19	42	27	15	11	122	57	52	47	174	104
OOMRAS—												
Central Provinces Oomras	19	10	—	—	(d) 15	(d) 16	24	16	32	17	56	33
Berar Oomras	24	6	—	—	(d) 14	(d) 12	38	18	11	9	49	27
Khandesh—Banilla	—	—	—	—	—	—	—	—	13	7	13	7
Khandesh Oomras	19	10	—	—	(f) 4	(f) 2	23	12	15	6	38	18
Central India—Malvi	—	—	—	—	—	—	—	—	18	34	18	34
Central India—Others	14	15	—	—	(f) 4	(g) 11	18	26	10	10	28	36
Barland Nagar Oomras	14	6	—	—	(h) 4	(h) 27	18	33	11	5	29	38
Total	90	47	—	—	31	58	121	105	110	88	231	193
YERUM 262	—	—	—	—	(h) 10	(h) 4	10	4	6	12	6	12
HYDERABAD GAURANI	—	—	—	—	—	—	—	—	52	50	62	54
Total	—	—	—	—	10	4	10	4	58	62	68	66
AMERICANS—												
Punjab—239 F (and New Types)	—	28	—	—	—	(b) 1	—	29	6	16	6	45
Punjab (Unspecified—4 F)	13	7	39	64	(b) 23	(b) 10	75	81	44	89	119	170
Sind—239 F and F 1	—	24	7	18	—	—	7	42	10	15	17	57
Sind (Unspecified—4 F)	17	2	4	28	—	(b) 1	21	31	19	18	40	49
Dharwar (Gadag 1)	—	—	—	—	—	—	—	—	6	4	6	4
Dharwar (Upland—Un- specified)	—	—	—	—	—	—	—	—	1	7	1	7
Cambodia (Coimbatore No 2)	—	—	—	—	—	—	—	—	61	62	61	62
Cambodia (Unspecified)	9	6	—	—	—	—	9	6	35	34	44	40
Total	39	67	50	110	23	12	112	189	182	245	294	434
BROACH—												
Surat Navsari (Surti)	8	61	—	—	—	—	8	61	26	42	34	103
Broach (Unspecified)	2	118	—	—	() 6	—	28	118	30	45	58	161
Total	30	179	—	—	6	—	36	179	56	87	92	264
DHOLLERAS—												
Matheo	18	2	—	—	—	—	18	2	5	4	23	6
Cutch	—	—	—	—	—	—	—	—	2	—	2	—
Wagad	—	—	—	—	—	—	—	—	32	28	32	28
Dholera (Unspecified)	27	143	—	—	(c) 7	() 6	34	149	10	6	44	155
Total	45	145	—	—	7	6	52	151	49	38	101	189
SOUTHERNS—												
Kumptas (Jayawant)	—	—	—	—	—	—	—	23	20	29	20	29
Kumptas (Unspecified)	—	—	—	—	—	—	—	—	81	49	31	77
Western (Jowari and Mungari)	22	10	—	—	() 3	() 35	34	100	4	4	104	170
Northern	—	—	—	—	() 14	() 10	14	20	6	8	18	26
Coimbatore (Waraingal)	—	—	—	—	—	—	—	—	20	19	20	19
Karunganni	6	1	—	—	—	—	6	1	24	40	30	41
Thanevel es	—	—	—	—	—	—	—	—	2	—	2	—
Salma	14	—	—	—	—	—	14	—	—	—	1	—
Unclassified	—	—	—	—	—	—	—	—	—	—	—	—
Total	42	74	—	—	26	75	69	149	192	224	224	373
COMILAS	—	—	—	—	—	—	—	—	—	—	—	—
BURMAS (Wagale & Wary)	1	—	—	—	—	—	1	—	1	—	2	—
OTHER SORTS (Unclassified)	10	4	—	—	—	—	10	4	—	—	19	6
Total Indian Cotton	32	53	92	197	113	165	83	838	77	794	1,000	1,000

*Standard Indian bales of approximate average gross weight 470 lbs. and net weight 39 lbs. of cleaned lint cotton.
N.H.—Detailed Statement of Mill Stocks on the 31st August 1936 is attached.

- (a) In Andhra Pradesh
(b) In the Punjab
(c) In Ahmedabad
(d) In the Central Provinces
(e) In Berar
(f) In East and West Khandesh Districts
(g) In India and Ceylon States
(h) In Hyderabad State
(i) In the Madras Presidency
† Includes 600 bales held at Ahmedabad
‡ Includes 600 bales held at Ahmedabad
§ Includes 600 bales held in Hyderabad State

STOCKS OF RAW COTTON HELD BY THE

(Compiled from Voluntary

(In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmed abad	Rest of Bombay Presidency	Total Bombay Presidency	Madras North	Madras South	Total Madras Presidency	United Provinces	Central Provinces	Berar	Total C.P. and Berar	Bengal
BENGALS—												
United Provinces	1	—	—	1	—	—	—	8	—	—	—	2
Punjab	2	—	—	2	—	—	—	1	—	—	—	—
Sind	—	1	—	1	—	—	—	—	—	—	—	—
Rajputana	3	—	—	3	—	—	—	—	—	—	—	1
Others	1	—	—	1	—	—	—	—	—	—	—	—
Total	7	1	—	8	—	—	—	9	—	—	—	3
OMRAS—												
Central Provinces Oomras	1	—	—	1	—	—	—	—	14	1	15	1
Derar Oomras	2	—	—	2	—	—	—	—	5	2	7	—
Khandesh—Banilla	1	—	3	4	—	—	—	—	1	—	1	—
Khandesh Oomras	1	—	3	4	—	—	—	—	—	—	—	—
Central India—Malvi	2	2	—	4	—	—	—	—	—	—	—	—
Central India—Others	3	—	2	5	—	—	—	1	—	—	—	—
Barat and Nagar Oomras	1	—	4	5	—	—	—	—	—	—	—	—
Total	13	2	16	31	—	—	—	1	20	3	23	1
VERUM 262	1	—	—	1	—	—	—	—	8	3	11	—
HYDERABAD GAURANI	5	—	22	27	3	—	3	—	10	1	11	—
Total	6	—	22	28	3	—	3	—	18	4	22	—
AMERICANS—												
Punjab—(289 F and New Types)	9	1	—	10	2	1	3	—	—	—	—	3
Punjab (Unspecified—4 F)	19	—	—	19	—	16	16	24	1	—	1	8
Sind—289 F & F 1	10	3	—	13	2	—	2	—	—	—	—	—
Sind (Unspecified—4 F)	6	2	—	8	—	8	8	—	—	—	—	1
Dharwar (Gadag 1)	4	—	—	4	—	—	—	—	—	—	—	—
Dharwar (Upland—Unspecified)	4	—	1	5	—	—	—	—	—	1	1	—
Cambodia (Colombatore No 2)	—	—	1	1	1	55	56	—	—	1	1	2
Cambodia (Unspecified)	10	—	1	11	1	21	22	—	—	—	—	1
Total	62	6	3	71	6	101	107	24	1	2	3	13
BROACH—												
Surat Navari (Surti)	14	18	3	35	—	—	—	—	1	—	1	1
Broach (Unspecified)	22	15	1	38	—	1	1	—	—	—	—	1
Total	36	33	4	73	—	1	1	—	1	—	1	2
DHOLLERAS—												
Mattheo	3	—	—	3	—	—	—	—	—	—	—	—
Cutch	—	—	—	—	—	—	—	—	—	—	—	—
Wagad	1	21	—	22	—	—	—	—	—	—	—	—
Dhollerass (Unspecified)	4	2	—	6	—	—	—	—	—	—	—	—
Total	8	23	—	31	—	—	—	—	—	—	—	—
SOUTHERNS—												
Kumtias (Jayawant)	17	1	3	23	6	—	6	—	—	—	—	—
Kumtias (Unspecified)	17	—	10	27	5	—	5	—	—	—	—	—
Westerns (Jowari and Mangard)	12	1	13	26	9	1	10	—	—	—	—	1
Northerns	1	—	—	1	15	1	19	—	—	—	—	—
Cocoanads (& Warangal)	—	—	2	2	1	—	1	—	—	—	—	1
Karungval	—	—	—	—	—	15	18	—	—	—	—	1
Tinnevelles	1	—	—	1	—	39	39	—	—	—	—	—
Salams	—	—	—	—	—	2	2	—	—	—	—	—
Total	48	2	30	80	39	61	100	—	—	—	—	3
COMILLAS	—	—	—	—	—	—	—	—	—	—	—	—
BURRAS (Wagale & Wagyl)	—	—	—	—	—	—	—	—	—	—	—	1
OTHER SORTS	—	—	—	—	—	—	—	—	—	—	—	—
Total Indian Cotton	190	67	73	372	48	163	211	34	40	9	49	25
AMERICANS	10	—	—	10	—	—	—	—	—	—	—	—
EGYPTIANS	4	7	1	12	1	1	2	—	—	—	—	1
EAST AFRICANS	19	12	4	35	—	2	2	—	1	—	1	2
Others (Sudan, Mesopotamia etc.)	4	1	1	6	—	—	—	—	—	—	—	—
Total Foreign Cotton	37	20	6	63	1	3	4	—	1	—	1	3
GRAND TOTAL	217	87	81	345	49	166	215	34	41	9	50	28

* Standard Indian bales of approximate average gross weight 400 lbs

MILLS IN INDIA ON 31st AUGUST, 1936.

Returns furnished by Mills)

of 400 lbs. each)

Punjab and Delhi	Rest of British India	Total British India	Hyderabad	Mysore	Baroda	Gwalior	Indore	Kathiawar States	Other Indian States	Pondicherry	Total Indian States	Grand Total	Trade Descriptions of Cotton	
4	—	15	—	—	—	—	—	—	—	—	—	—	BENGALS—	
3	6	12	—	—	—	—	—	—	—	—	—	16	United Provinces	
—	—	1	—	2	—	—	—	—	—	—	—	12	Punjab	
—	10	14	—	—	—	—	—	—	—	—	—	3	Sind	
—	—	1	—	—	—	—	—	—	—	—	—	15	Rajputana	
—	—	—	—	—	—	—	—	—	—	—	—	—	Others	
7	18	43	—	2	—	1	—	—	1	—	4	47	Total	
—	—	17	—	—	—	—	—	—	—	—	—	17	OOMRAS—	
—	—	9	—	—	—	—	—	—	—	—	—	8	Central Provinces Oomras	
—	—	7	—	—	—	—	—	—	—	—	—	7	Berar Oomras	
—	—	6	—	—	—	—	—	—	—	—	—	6	Khandesh—Banilla	
—	—	4	—	—	1	9	17	—	3	—	30	34	Khandesh Oomras	
—	—	8	1	—	—	—	1	—	—	—	2	10	Central India—Malvi	
—	—	5	—	—	—	—	—	—	—	—	—	5	Central India—Others	
—	—	—	—	—	—	—	—	—	—	—	—	—	Barsi and Nagar Oomras	
—	—	58	1	—	1	9	18	—	3	—	32	88	Total	
—	—	12	—	—	—	—	—	—	—	—	—	12	VERUM 262	
—	—	41	9	—	—	—	—	—	—	—	9	50	HYDERABAD GAURANI	
—	—	53	9	—	—	—	—	—	—	—	9	62	Total	
—	—	16	—	—	—	—	—	—	—	—	—	16	AMERICAN—	
12	3	83	—	—	3	—	1	—	1	—	6	89	Punjab—(289-F and New Types)	
—	—	15	—	—	—	—	—	—	—	—	—	15	Punjab(Unspecified—4 F)	
—	—	17	—	—	1	—	—	—	—	—	—	18	Sind—289 F & F-1	
—	—	4	—	—	—	—	—	—	—	—	—	4	Sind(Unspecified—4 F)	
—	—	—	—	—	—	—	—	—	—	—	—	—	Dharwar (Gadag 1)	
—	—	6	—	—	—	—	—	—	—	1	1	7	Dharwar (Upland—Unspecified)	
—	—	—	—	—	—	—	—	—	—	—	—	—	Cambodia	
—	—	60	—	—	1	—	—	—	1	—	2	62	Combatores	
—	—	34	—	—	—	—	—	—	—	—	—	34	No 2)	
—	—	—	—	—	—	—	—	—	—	—	—	—	Cambodia (Unspecified)	
12	3	235	—	—	5	—	1	—	2	2	10	245	Total	
—	—	37	—	—	—	1	—	1	2	—	1	5	42	BROACH—
—	—	40	—	—	—	1	—	1	—	—	1	5	43	Surel Navsari (Surel)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	Broach (Unspecified)
—	—	77	—	—	—	2	—	2	2	—	2	8	83	Total
—	—	3	—	—	—	—	—	—	1	—	—	1	4	DHOLLERAS—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	Matthoo
—	—	22	—	—	—	1	—	—	3	—	—	6	28	Cutch
—	—	6	—	—	—	—	—	—	—	—	—	—	6	Warad
—	—	—	—	—	—	—	—	—	—	—	—	—	—	Dhollerias (Unspecified)
—	—	31	—	—	—	1	—	—	6	—	—	7	39	Total
—	—	29	—	—	—	—	—	—	—	—	—	—	29	SOUTHERNS—
—	—	32	—	—	14	—	—	—	—	—	—	17	49	Kanpur (Jaywant)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	Kanpur (Unspecified)
—	—	37	1	13	—	—	—	—	—	—	1	15	42	Western (Jowar) and
—	—	20	—	6	—	—	—	—	—	—	1	7	27	Mungari)
—	—	4	—	—	—	—	—	—	—	—	—	—	—	Northern
—	—	19	—	—	—	—	—	—	—	—	—	—	6	Coimbatore (A Warangal)
—	—	40	—	—	—	—	—	—	—	—	—	—	19	Kanpur (Surel)
—	—	2	—	—	—	—	—	—	—	—	—	—	40	Tissore (Surel)
—	—	—	—	—	—	—	—	—	—	—	—	—	2	Sakma
—	—	183	2	33	—	—	—	—	—	3	3	41	224	Total
—	—	—	—	—	—	—	—	—	—	—	—	—	—	FOOTLEAF
—	—	2	—	—	—	—	—	—	—	—	—	—	—	LEAF (Wagla & Wagla)
—	—	—	—	—	—	—	—	—	—	—	—	—	—	STOCK SCOT
19	21	691	12	42	4	11	20	8	9	7	113	794	Total Indian Cotton	
—	—	10	—	—	—	—	—	—	—	—	—	—	10	AMERICAN
—	—	15	—	—	—	—	—	—	—	—	—	—	19	GOVTILAS
—	—	40	—	—	—	—	—	—	—	—	—	—	44	PAST AFRIKANA
—	—	6	—	—	—	—	—	—	—	—	—	—	6	YULESS (Sakal, Mungari, etc.)
—	—	71	—	—	—	3	4	—	—	—	—	—	79	Total Foreign Cotton
19	21	752	12	45	8	11	20	8	9	7	121	873	GRAND TOTAL	

and net weight 392 lbs. of cleaned (Fut) cotton.

**STOCKS ON 31st JANUARY, 1935 AND 1936 OF "TINNEVELLIES," "SALEMS"
AND "CAMBODIAS" HELD BY THE MILLS AND THE TRADE
IN THE MADRAS PRESIDENCY.**

(In thousand bales of 400 lbs. net)

TRADE DESCRIPTIONS OF COTTON	Mill stocks on 31st January		Trade stocks on 31st January.		Total stocks on 31st January.	
	1935	1936	1935.	1936	1935	1936.
Tinnevelles	21	14	7	12	28	26
Salems	10	6	2	3	12	9
Cambodias	42	41	11	22	53	63
Total	73	61	20	37	93	98

APPENDIX XIII.

EXPORTS BY SEA OF INDIAN RAW COTTON CLASSIFIED BY VARIETIES.

(Compiled from Voluntary Returns furnished by Exporters)
1st September 1935 to 31st August 1936
(In thousand bales* of 400 lbs each)

Trade Descriptions of Cotton	Exported to				Total Exports
	Europe (excluding United Kingdom and the West)	United Kingdom	Japan	China and the East (excluding Japan)	
BENGALS—					
United Provinces	20	8	28	2	58
Punjab	210	73	223	16	522
Sind	130	40	37	1	208
Rajputana	9	7	8	—	24
Others	3	4	27	—	34
Total	372	132	323	19	846
OOMRAS—					
Central Provinces—Oomras	48	36	85	1	170
Berar—Oomras	37	13	204	4	258
Khandesh—Banilla	1	—	16	—	16
Khandesh—Oomras	33	—	175	10	218
Central India—Malva	4	—	14	—	18
Central India—Others	20	1	122	28	171
Bara and Nagar—Oomras	10	1	53	14	78
Unclassified	24	5	106	—	135
Total	177	56	774	57	1,064
VERUM 262	—	—	—	—	—
HYDERABAD GAORANI	1	—	6	—	7
Total	1	—	6	—	7
AMERICANS—					
Punjab—289 F	3	1	1	—	5
Punjab (Unspecified—4 F)	164	159	359	17	699
Sind Sudhar—(289 F & F 1)	2	3	—	2	7
Sind (Unspecified—4 F)	9	20	30	—	59
Dharwar (Gadag 1)	1	—	1	—	2
Dharwar (Upland—Unspecified)	—	—	10	—	10
Cambodia (Coimbatore No 2)	2	—	18	1	21
Cambodia (Unspecified)	7	5	11	—	23
Total	188	188	430	20	826
BROACH—					
Surat Navsari (Surti)	10	2	18	—	30
Broach (Unspecified)	42	18	63	11	134
Total	52	20	81	11	164
DHOLLERAS—					
Mattheo	51	—	32	3	86
Cutch	—	—	7	—	7
Wagad	—	—	1	—	1
Dhollerias (Unspecified)	3	—	73	6	82
Total	54	—	113	9	176
SOUTHERNS—					
Kumtias (Jayawant)	—	—	—	—	—
Kumtias (Unspecified)	—	—	—	—	—
Westerns (Jowari and Mungari)	19	—	45	2	66
Northern	12	—	8	—	20
Cocona las (and Warangal)	18	13	—	—	31
Karunganni	5	1	3	—	9
Tinnevelies	9	4	42	—	55
Salams	1	1	—	—	2
Total	64	19	98	2	183
COMILLAS	52	11	5	1	69
BURMAS (Wagale and Wazvi)	1	2	6	—	9
OTHER SORTS (Unclassified)	4	1	2	5	12
GRAND TOTAL	965	429	1,535	124	2

Total exports, as per official returns, from British Indian and Kathiawar Ports—Bales of 400 lbs net

1 09

1

2 002

124

1 470 lbs. and net

* Standard Indian bales of approximate 400 lbs net cotton.

RECEIPTS AT MILLS IN INDIA OF

(Compiled from returns
1st September 1935 to
(In thousand bales*)

Trade Descriptions of Cotton	Bombay Island	Ahmedabad	Rest of Bombay Presidency	Total Bombay Presidency	Madrass Presidency	United Provinces	C P & Berar	Bengal	Punjab and Delhi	Rest of British India
DECCANS—										
United Provinces	11	—	1	12	—	92	1	12	28	—
Punjab	19	1	2	22	—	6	—	1	16	—
Sind	6	3	—	9	1	—	—	—	—	2
Rajputana	16	1	—	17	—	2	—	—	—	18
Others	8	—	—	8	—	—	—	—	—	—
Total	60	5	3	68	1	100	1	15	44	20
OOMRAS—										
Central Provinces Oomras	23	—	—	23	—	3	53	10	—	—
Barar Oomras	22	1	1	24	—	3	31	2	—	—
Khandesh—Banilla	5	—	18	23	—	—	1	—	—	—
Khandesh Oomras	19	1	15	35	—	—	—	—	—	—
Central India—Malvi	10	13	—	23	—	4	—	2	—	—
Central India—Others	39	3	3	45	—	12	—	—	—	—
Barani and Nagar Oomras	7	—	19	26	—	—	—	—	—	—
Total	122	18	56	196	—	22	86	14	—	—
VERUM 282	4	1	1	6	—	—	23	—	—	—
HYDERABAD GAURANI	20	—	37	57	—	—	15	—	—	—
Total	24	1	38	63	—	—	38	—	—	—
AMERICANS—										
Punjab—289 F (and New Types)	26	5	1	32	8	1	—	6	13	—
Punjab (Unspecified—4 F)	79	2	1	82	38	86	4	35	35	6
S and Suddhar (289 F and F-1)	41	16	1	58	2	—	—	1	—	—
S and (Unspecified—4 F)	44	11	2	57	30	—	—	2	—	—
Dharwar (Gadag I)	5	—	1	6	—	—	—	—	—	—
Dharwar (Upland—Unspecified)	9	1	3	13	—	—	—	—	—	—
Cambodia (a Combatoire No 2)	4	1	2	7	110	—	1	2	—	—
Cambodia (Unspecified)	12	2	2	16	54	—	2	5	—	—
Total	220	39	13	271	242	87	7	51	48	6
BROACH—										
Surti Navsari (Surti)	36	63	7	106	—	—	1	1	—	—
Broach (Unspecified)	76	51	3	129	1	—	—	2	—	—
Total	112	113	10	235	1	—	1	3	—	—
DHOLLERAS—										
Matthao	18	1	—	19	—	—	—	—	—	—
Cutch	1	—	—	1	—	—	—	—	—	—
Wagad	6	66	3	75	—	—	—	—	—	—
Dholeras (Unspecified)	16	10	1	27	—	—	—	—	—	—
Total	41	107	4	152	—	—	—	—	—	—
SOUTHERNS—										
Kompas (Jaysawant)	31	2	8	41	6	—	—	1	—	—
Kompas (Unspecified)	34	1	20	55	1	—	—	1	—	—
Westerns (Jowari and Mangari)	37	3	35	75	20	—	—	3	—	—
Northerns	2	—	—	2	12	—	—	—	—	—
Cocoadas (and Warangal)	1	—	2	3	4	—	—	4	—	—
Karunganni	1	—	—	1	47	—	—	2	—	—
Tinnevelly	3	—	1	4	64	—	—	1	—	—
Salerns	—	—	—	—	5	—	—	—	—	—
Total	109	6	66	181	159	—	—	12	—	—
COMILLAS	—	—	—	—	—	—	—	—	—	9
BURMAS (Wagale and Wagyi)	—	—	—	—	—	—	—	—	—	—
OTHER SORTS	1	—	1	2	3	—	—	1	—	—
Total Indian Cotton	859	258	191	1,448	406	209	133	95	97	33
AMERICANS	21	2	—	23	—	—	—	1	—	—
EGYPTIANS	21	32	1	54	5	—	—	2	1	—
EAST AFRICANS	86	100	12	198	4	—	—	9	2	—
OTHERS (Sudan, Mesopotamia etc.)	13	3	3	21	—	—	—	1	—	—
Total Foreign Cotton	141	139	16	296	9	—	—	13	3	—
GRAND TOTAL	830	427	207	1,464	415	209	133	109	100	33
Indian raw cotton consumed in mills in India. (Figures compiled mainly from returns under the Ind in Cotton Cess Act—Bales of 900 lbs. net)										
	864	321	204	1,389	375	317	13	99	90	34

* Standard Indian bales of approximate average

XIV.

RAW COTTON CLASSIFIED BY VARIETIES.

furnished by Mills)

31st August 1936

of 400 lbs each)

Total British India	Hyder abad	Mysore	Baroda	Gwalior	Indore	Kathwar States	Other Ind an States	Pondicherry	Total Indian States	Grand Total	Trade Descriptions of Cotton
145	—	—	—	13	—	—	4	—	17	162	BENGALS—
47	—	—	—	—	—	—	1	—	3	50	United Provinces
10	—	—	—	—	—	—	—	—	3	13	Punjab
37	—	—	—	1	2	1	8	—	12	49	Sind
8	—	—	—	—	—	—	—	—	—	8	Rajputana
											Others
247	—	5	—	14	2	1	13	—	35	282	Total
89	—	—	—	—	—	—	2	1	3	92	OOMRAS—
60	—	—	—	—	—	—	1	—	1	61	Central Provinces Oomras
24	—	—	—	—	—	—	—	—	—	24	Barar Oomras
38	—	—	—	—	—	—	—	—	—	36	Khandesh—Banilla
27	—	—	7	54	68	—	10	—	139	166	Khandesh Oomras
58	1	—	—	1	28	—	3	—	31	87	Central Ind a—Malvi
28	—	—	—	—	—	—	—	—	—	28	Central India—Others
											Barri and Nagar Oomras
318	1	—	7	55	94	—	16	1	174	492	Total
29	—	—	1	—	—	—	—	—	1	30	VERUM 262
72	23	—	—	—	—	—	—	—	23	95	HYDERABAD GAORANI
101	23	—	1	—	—	—	—	—	24	125	Total
60	—	—	1	1	—	—	3	1	6	68	AMERICANS—
286	—	5	—	19	—	1	2	3	30	316	Punjab—289 F (and New Types)
61	—	—	—	—	—	—	—	—	—	61	Punjab (Unspecified—4 F)
89	—	1	1	—	—	1	—	1	4	93	Sind Sudhar (289 F and F—1)
6	—	—	—	—	—	—	—	—	—	6	Sind (Unspecified—4 F)
13	—	—	—	—	—	—	—	1	1	14	Dharwar (Lead 1)
120	—	1	—	—	—	—	5	—	6	126	Dharwar (Upland—Unspecified)
77	—	1	—	—	—	—	1	—	2	79	Cambodia (Combatoire No 2)
											Cambodia (Unspecified)
712	—	8	2	20	—	2	11	6	49	761	Total
108	—	—	5	1	1	6	1	2	16	124	BROACH—
132	—	—	4	—	2	—	1	1	8	140	Surat Navsari (Surti)
											Broach (Unspecified)
240	—	—	9	1	3	6	2	3	24	264	Total
19	—	—	1	—	—	6	—	—	7	26	DHOLLERAS—
1	—	—	—	—	—	—	—	—	—	1	Mattheo
105	—	—	9	—	—	19	1	—	29	134	Cutch
27	—	—	—	—	1	—	—	—	1	23	Wagad
											Dholleras (Unspecified)
152	—	—	10	—	1	23	1	—	37	189	Total
48	—	—	—	—	—	—	5	—	22	48	SOUTHERNS—
87	—	17	—	—	—	—	1	2	22	79	Kumtias (Jayawant)
98	3	15	1	—	—	—	—	1	22	120	Kumtias (Unspecified)
14	4	8	1	—	—	—	—	1	14	28	Westerns (Jowari and Mangari)
11	—	—	—	—	—	—	2	2	4	15	Northern
50	—	—	—	—	—	—	—	—	—	50	Coromandas (and Warangal)
69	—	—	—	—	—	—	3	—	3	72	Aurangabad
5	—	—	—	—	—	—	—	—	—	5	Tingavallies
											Salema
352	7	40	2	—	—	—	11	5	65	417	Total
11	—	—	—	—	—	—	—	—	—	11	LOWILLAS
6	—	—	—	—	—	—	—	—	—	6	Itamas (Wagale and Wagn)
											OTHER SORTS
2 139	31	63	31	90	100	34	54	15	413	2,532	Total Indian Cotton
24	—	—	—	—	—	—	—	1	1	25	AMERICANS
62	—	3	5	—	—	—	—	—	10	72	LOVETIANS
213	—	—	16	1	1	3	—	—	21	234	AFRICANS
22	—	—	—	—	—	—	—	—	—	22	OTHERS (Doda, New-Yetam a, etc.)
321	—	5	21	1	1	3	—	1	32	353	Total Foreign Cotton
2 460	31	63	52	91	101	3	54	16	445	2 905	GRAND TOTAL
2 328	51	51	52	72	113	37	52	20	448	2 876	Indian raw cotton consumed in Mills in India. (7 galls computed mainly from returns under the Indian Cotton Cess Act—Falls at 400 lbs. net)

gross weight 400 lbs and net weight 362 lbs. of cleaned

APPENDIX XV

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31ST 1936

INDIAN CENTRAL COTTON COMMITTEE OFFICE

1. Secretary

Mr P H Rama Reddi, M.A., B.Sc I.A.S

On deputation from Madras Department of Agriculture.

2. Publicity Officer

Mr R D Mhara M.A. Agri (Oxon) Post Grad. D p Agri (Oxon.) Post Grad. Res. B L tt (Oxon)

TECHNOLOGICAL LABORATORY, BOMBAY

3. Director

Dr Nazir Ahmad M.Sc Ph.D (Cantab) F Inst P

Late Head of Science Department, Ialania College Lahore and Assistant Director Technological Laboratory Matunga Bombay

4. Spinning Master

Mr R P Richardson F.T.I

Demonstrator (Cotton Spinning) Technical College Oldham

5. Senior Research Assistant (Chemist)

Mr D L Sen M.Sc Tech (Manch) M.Sc (Bom) A.I.I.Sc A.I.C

Research Student at the Indian Institute of Science and Manchester College of Technology

6. Senior Research Assistant (Physicist)

Mr. V Hari Rao M.Sc (Calcutta)

Research Scholar Technological Laboratory (Textile Physics)

7. Senior Research Assistant (Physicist)

Mr Ram Saran Koshal M.Sc (Punjab)

Research Scholar Technological Laboratory (Textile Physics)

8. Junior Research Assistant (Microscopist)

Mr Amar Nath Gulati M.Sc (Punjab)

Imperial Institute of Veterinary Research Mukteswar U.P

9. Junior Research Assistant

Mr C Nanjundayya, M.Sc (Calcutta)

Research Scholar Technological Laboratory (Textile Physics)

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—contd

TECHNOLOGICAL LABORATORY BOMBAY—contd

10	Junior Research Assistant	Dr. K. R. Sen D Sc (Dacca)	.	.	Research Scholar Technological Laboratory and Technological Assistant Lyalpur	—
11	Statistician and Personal Assistant	Mr V Venkataraman M A (Madras)			Statistical Assistant, Labour Office Government of Bombay, Bombay	—
12	Temporary Chemist	Dr. Levi Thoria Dr Ing (Germany)				—
13	Electrician	Mr Herculano Lobo LEE (V J T I)		..		—
14	Spinning Assistant	Mr V Iyengar				—
15	Senior Tester	Mr H B Joshi, B Sc		..	.	—
16	Senior Tester	Mr S S Sukthanker L T C (V J T I)				—
17	Junior Tester	Mr K. G. Deo .	.	.	..	—
18	Junior Tester	Mr R G Panvalkar, B Sc		.	.	—
19	Junior Tester	Mr G D Bhade B Sc		..	..	—
20	Junior Tester	Mr K V N Nayar	.	.	..	—
21	Junior Tester	Mr V V Modak B Sc		.	.	—
22	Junior Tester	Mr L V Sundaraman B A		.	.	—
23	Junior Tester	Mr P S Sambamurthy				—
24	Junior Tester	Mr G J Kharkar, B Sc	.		.	—
25	Junior Tester	Mr Sasoon Samson B Sc				—
26	Junior Tester	Mr A J Farid				—
27	Junior Tester	Mr U K. Benegal B A				—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES
FUNDS AS ON AUGUST 31st 1936—*contd*

TECHNOLOGICAL LABORATORY BOMBAY—*contd*

24 Junior Tester	Mr P V Vachane B Sc	—
25 Junior Tester	Mr C S Ramnathan B Sc	—
30 Junior Tester	Mr S N Rao M Sc	—
31 Junior Tester	Mr B N Prabhakar B Sc	—
32 Draughtsman	Mr D G Mohita	—
33 Statistical Clerk	Mr R Krishna Iyer	—
34 Statistical Clerk	Mr P K Wagle	—
35 Mechanic	Mr J B Khanna	—

INSTITUTE OF PLANT INDUSTRY, INDORE

36 Director	Mr T R Low, B Sc, (Agrn) (London), I A S	Principal Agricultural College, Cawnpore On deputation from the United Provinces Department of Agriculture.
37 Geneticist and Botanist	Mr J B Hutchinson, M A (Cantab)	Assistant Geneticist and Botanist, Trinidad (1926-33)
38 Chemist and Agronomist	Mr Y D Wad, M A. M Sc (Bombay) A I Sc	Research Student, Indian Central Cotton Committee
39 Farm Superintendent	Mr G C Tambo, B Ag (Bombay)	—
40 Extension Officer	Mr Hubert Singh, B Ag (Bombay)	—
41 Senior Botanical Assistant	Mr R L M Chose, M Sc (Allahabad)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES
FUNDS AS ON AUGUST 31st 1936—*contd*

INSTITUTE OF PLANT INDUSTRY INDORE— <i>contd</i>		Research Student Cotton Committee	Indian	Central
42	Assistant Farm Superintendent	Mr S C Talasila B Ag (Bombay)	—	—
43	Personal Assistant	Mr A N Srivastava M Sc (Lucknow)	—	—
44	Statistical Assistant	Mr V G Panse B Sc (Bombay)	—	—
45	Gerontological Assistant	Mr Bholanath M Sc (Punjab)	Research Student Cotton Committee	Indian Central
46	Plant Breeding Assistant	Mr C P Dutt M Sc (Calcutta)	—	—
47	Field Assistant	Mr K M S mlote B Ag (Nagpur)	—	—
48	Botanical Assistant	Mr P D Gadkari M Sc (Nagpur)	—	—
49	Seasonal Plant Breeding Assistant	Mr M A A Ansan M Sc (Lucknow)	Research Student Industry Indore	Institute of Plant
50	Chemical Assistant (Temporary)	Mr R K Aurangabadkar M Sc (Allahabad)	Do	do
51	Agromonomical Assistant (Temporary)	Mr K V Ambegonkar M Sc (Benares)	Do	do
52	Junior Farm Assistant (Temporary)	Mr V N Bhargava, B Sc (Allahabad)	Do	do
53	Junior Farm Assistant (Temporary)	Mr S S Gangadhar Bhotla B Ag (Bombay)	—	—
54	Artist	Mr J S Onear	—	—
BOMBAY RESEARCH SCHEMES				
(a) <i>Broom Cotton Breeding Scheme</i>				
	Breeder	Mr P L Patel M Sc (Iowa U S A)	—	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31st 1936—*contd*

TECHNOLOGICAL LABORATORY BOMBAY—*contd*

28	Junior Tester	Mr P V Nachane B Sc	—
29	Junior Tester	Mr C S Ramanathan B Sc	—
30	Junior Tester	Mr S N Rao M Sc	—
31	Junior Tester	Mr B N Prabhakar B Sc	—
32	Draughtsman	Mr B G Mehta	—
33	Statistical Clerk	Mr R Krishna Iyer	—
34	Statistical Clerk	Mr P K Wagle	—
35	Mechanic	Mr J B Kharas	—

INSTITUTE OF PLANT INDUSTRY, INDORE

26	Director	Mr T R Low, B Sc, (Agr) (London) I A S	Principal, Agricultural College, Cawnpore On deputation from the United Provinces Department of Agriculture.
27	Geneticist and Botanist	Mr J B Hutchinson M A (Cantab)	Assistant Geneticist and Botanist, Trinidad (1926-33)
38	Chemist and Agronomist	Mr Y D Wad M A, M Sc (Bombay) A.I.Sc	Research Student, Indian Central Cotton Committee
39	Farm Superintendent	Mr G C Tambe B Ag (Bombay)	..
40	Extension Officer	Mr Kuber Singh B Ag (Bombay)	..
41	Senior Botanical Assistant	Mr R L M Ghose M Sc (Allahabad)	..

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31st 1936—*contd*

INSTITUTE OF PLANT INDUSTRY INDORE—*contd*

		Mr S C Talwara B Ag (Bombay)	Research Student Cotton Committee	Indian	Central
42	Assistant Farm Superintendent				
43	Personal Assistant	Mr A. N. Srivastava M Sc (Lucknow)	—		
44	Statistical Assistant	Mr V G Panse B Sc (Bombay)	—		
45	Perpetual Assistant	Mr Bholanath M Sc (Punjab)	Research Student Cotton Committee	Indian	Central
46	Plant Breeding Assistant	Mr C P Dutt M Sc (Calif)	—		
47	Extra Assistant	Mr K M S inlote B Ag (Nagpur)	—		
48	Personal Assistant	Mr P D Gadkar M Sc (Nagpur)	King Edward Memorial Inland Research Scholar at I P I		
49	Senior Plant Breeding Assistant	Mr M A A Ansari M Sc (Lucknow)	Research Student, Institute of Plant Industry, Indore		
50	Chemical Assistant (Temporary)	Mr B K Aurangabadkar M Sc (Allahabad)	Do	do	
51	Agronomical Assistant (Temporary)	Mr K N Ambegaonkar M Sc (Benares)	Do	do	
52	Junior Farm Assistant (Temporary)	Mr V N Bhargava B Sc (Allahabad)	Do	do	
53	Perpetual Farm Assistant (Temporary)	Mr S S Gangadhar Bhoila B Ag (Bombay)	—		
54	Artist	Mr J S O'car	—		
		BOMBAY RESEARCH SCHEMES			
		(a) <i>Brooch Cotton Breeding Scheme</i>			
55	Grass Breeder	Mr P L Patel M Sc (Iowa U S A)	—		

BOMBAY RESEARCH SCHEMES—*contd*

Breach Cotton Breeding Scheme—contd

56 Botanical Assistant	Mr B J Thakar B.Ag	On deputation from Bombay Department of Agriculture
57 Pathological Assistant	Mr Y S Kulkarni B Ag (Bombay)	—
58 Botanical Assistant	(ii) <i>Jalgaon Cotton Breeding Scheme</i> Mr V L Bhosekar, B Ag (Bombay)	On deputation from Bombay Department of Agriculture
59 Pathological Assistant	Mr J D Ranadive B Ag (Bombay)	Research Student, Indian Central Cotton Committee.

BOMBAY SEED DISTRIBUTION SCHEMES

(i) *Surat Scheme*

60 Cotton Assistant	Mr V D Desai	On deputation from Bombay Department of Agriculture
61 Cotton Assistant	Mr V V Patel, B Ag (Bombay)	Do do
62 Cotton Superintendent, Amalner	(ii) <i>Khandesh (Banilla) Scheme</i> Mr S V Shevdo, L Ag	On deputation from Bombay Department of Agriculture
63 Agricultural Overseer	Mr R B Nimbalkar, B Ag (Bombay)	Do do
64 Superintendent, Bhadgaon Farm	Mr D M Kulkarni, B Ag (Bombay)	Do do
65 Agricultural Overseer	(iii) <i>B D S Scheme</i> Mr D A. Dave, B.Ag	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—*contd*

BOMBAY SEED DISTRIBUTION SCHEMES—*contd*

(iv) *Jaywant Scheme*

65	Agricultural Overseer	Mr B S Tadsur B Ag (Bombay)	—
67	Agricultural Overseer	Mr B M Dharmna B Ag (Bombay)	—
68	Agricultural Overseer	Mr D V Hremath B Ag (Bombay)	—
69	Agricultural Overseer	Mr S M Teppashtu B Ag (Bombay)	—
70	Agricultural Overseer	Mr V H Halgat B Ag (Bombay)	—
		(v) <i>Godag No 1 Scheme</i>	
71	Agricultural Overseer	Mr B S Patil B Ag (Bombay)	—

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BOMBAY COTTON FORECAST IMPROVEMENT SCHEME

72	Investigational Officer	Mr G R Ambekar School Final	On deputation from Bombay Department of Agriculture
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SIND PHYSIOLOGICAL RESEARCH SCHEME

73	Extension Officer	Mr B M Dabral M Sc (Benares)	—
74	Senior Assistant	Dr A M Nakh M Sc (Bombay) Ph D (London) DIC AIC	—
75	Junior Assistant	Mr Rustom M Ranj D p Ag (Bombay)	—
76	Junior Assistant	Mr H W Mughal D p Ag (Bombay)	On deputation from Bombay Department of Agriculture
77	Junior Assistant	Mr T J Malkam M Sc (with distinction) (Bombay)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1939—*contd*

SIND SEED DISTRIBUTION SCHEME

78	Statistical Assistant	Mr S S Choney, B Sc (Agra)	—	
79	Cotton Supervisor, Indus Left Bank Murpurkhas	Mr H A Idnani, B Ag (Bombay)	..	Research Student, Indus Central Cotton Committee, on deputation from Sind Department of Agriculture
80	Cotton Supervisor, Indus Right Bank Dadu	Mr W P Shahani B Ag (Bombay)	..	On deputation from Sind Department of Agriculture
81	Senior Assistant to Cotton Supervisor Indus Right Bank	Mr Agha Khan Mahomed 2 years Iyallpur Course		Do do
82	Senior Assistant to Cotton Supervisor Indus Left Bank	Mr A R Aram B Ag (Bombay) (Manchester)		Do do
83	Junior Assistant to Cotton Supervisor Indus Right Bank	Mr Lekhra		Do do
84	Junior Assistant to Cotton Supervisor Indus Right Bank	Mr W R Shahani		—
85	Junior Assistant to Cotton Supervisor, Indus Right Bank	Mr Gulshah Umarshah	.	On deputation from Sind Department of Agriculture
86	Junior Assistant to Cotton Supervisor Indus Right Bank	Mr Premrang T Advani	.	—
87	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr S A Sidika, Dip Agri (Bombay)		—
88	Junior Assistant to Cotton Supervisor Indus Left Bank	Mr K. S Tharumal		On deputation from Sind Department of Agriculture
89	Junior Assistant to Cotton Supervisor, Indus Left Bank	Mr T T Narandas	..	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—contd

SIXD SEED DISTRIBUTION SCHEME—contd

90	Junior Assistant to Cotton Supervisor In his Left Hand.	Mr J o e D A l v a n i B.A. (Bombay)	On deputat on from Sand Department of Agriculture
91	Junior Assistant to Cotton Supervisor In his Left Hand.	Mr L a c h m a n d a s	—
92	Junior Assistant to Cotton Supervisor In his Left Hand.	Mr A. G. P r a d a B.A. (Bombay)	On deputat on from Sand Department of Agriculture
93	Junior Assistant to Cotton Supervisor In his Left Hand.	Mr H. N. P o l n a B.A. (Bombay)	—

CENTRAL PROVINCES RESEARCH SCHEMES

(1) Botanical Scheme

94	Senior Botanist for Cotton	Mr D. V. M a h t a B.A. (Oxon) F.L.S.	On deputat on from Central Provinces Department of Agriculture
95	Assistant to Economic Botanist for Cotton.	Mr S. C. R o y L.A. and Post Graduate Pusa	Do do
96	Assistant to Economic Botanist for Cotton	Mr S. S. I a n i e M.Sc. (Punjab)	Research Student Indian Central Cotton Committee.
97	Assistants to Economic Botanist for Cotton	Mr D. G. S a w a g a n k a r L.A. (Hons)	On deputat on from Central Provinces Department of Agriculture
98	Assistant to Economic Botanist for Cotton	Mr D. L. J a n a n a L.A. (Hons)	Do do
99	Assistant to Economic Botanist for Cotton	Mr D. Y. B l a n d L.A. (Hons)	Do do
100	Assistant to Economic Botanist for Cotton	Mr V. N. P a r a n p e B.Sc.	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES
FUNDS AS ON AUGUST 31st 1936—contd

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CENTRAL PROVINCES RESEARCH SCHEMES—contd

(ii) Entomological Scheme

101	Agricultural Assistant	Mr M S Patel B Ag	—
COMBINED LONG STAPLE COTTON AND MARKETING OF VERUM COTTON SCHEMES IN C P AND DEKAR			
102	Agricultural Assistant	Mr J P T wari B Ag	—
103	Agricultural Assistant	Mr L P Khare B Ag	—
104	Agricultural Assistant	Mr G N Wardadkar B Ag	—
105	Agricultural Assistant	Mr L B Deshpande B Ag	—
106	Agricultural Assistant	Mr N B Chancholkar B Ag	—
107	Agricultural Assistant	Mr J N Kelkar B Ag	—
108	Agricultural Assistant	Mr G C Tiwari Certificate Course of Agricultural College Nagpur	—
109	Agricultural Assistant	Mr W B Patwardhan B Ag	—
110	Agricultural Assistant	Mr M D Anadeo B Ag	—
111	Agricultural Assistant	Mr Rafat Ali Haqqani B Ag	—
112	Agricultural Assistant	Mr K Sheoram Singh Chowhan B Ag	—
113	Agricultural Assistant	Mr R S Shrivalkar B Ag	—
114	Agricultural Assistant	Mr V S Hingankar B Ag	—

MADRAS RESEARCH SCHEMES

(i) *Herbaceum Scheme*

115	Gazetted Assistant	Mr R Balasubramania Ayyar B A B Sc (Ag)	On deputation from Madras Department of Agriculture
116	Junior Assistant	Mr G Seshadr Ayyangar M A	—
117	Junior Assistant	Mr V Ramaswami Mudaliar B A	—
118	Sub Assistant	Mr D Devasirvatham S S L C (Botany) (Intermed etc)	On deputation from Madras Department of Agriculture

(ii) *Pemphigus and Physiological Scheme*

119	Pro Chemist	Dr S Kasinatha Ayyar B A Ph D (London)	On deputation from Madras Department of Agriculture
120	Principal Investigator	Mr T R Narayana Ayyar B A (Cantab), B Sc (Ag)	Do do
121	Principal Investigator	Mr P V Krishna Ayyar B A	Do do
122	Assistant Botanist	Mr K Dharma Rajulu M Sc (Bombay)	Research Student Indian Central Cotton Committee
123	Assistant Entomologist	Mr V Margabalanu M A	On deputation from Madras Department of Agriculture
124	Assistant Botanist	Mr N C Narayanan B Sc (Ag)	—
125	Assistant Entomologist	Mr P S Narayanaswami B Sc (Ag)	On deputation from Madras Department of Agriculture
126	Assistant Chemist	Mr K Satharishu B Sc (Ag)	—
127	Assistant Botanist	Mr S Anantham B Sc (Ag)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1935—*contd*

MADRAS RESEARCH SCHEMES—*contd*

(iii) *Fodder Cholera Scheme*

128 Assistant Mr M R Balakrishnan B A, B Sc (Agrn) On deputation from Madras Department of Agriculture

129 Assistant Mr S Sundaram, B A, B Sc (Agrn) Do do

(iv) *Breeding of Nadam Cotton*

130 Assistant Mr R Krishnamurthi B Sc (Ag) Do do

MADRAS SEED DISTRIBUTION SCHEMES

(i) *Pay and Allowance of Business Manager*

131 Business Manager, Tiruppur Co Mr K. Arundanayagam Pillar S S L C., L. Ag On deputation from Madras Department of Agriculture 1935

(ii) *Co 2 Scheme*

132 Agricultural Demonstrator Mr Damodara Prabhu, B Sc (Agrn) Do do

133 Agricultural Demonstrator Mr L Krishnan B.A., B Sc (Agrn) Do do

134. Agricultural Demonstrator Mr P P Syed Mohamed B Sc (Agrn) Do do

135 Agricultural Demonstrator Mr P N Muthuswami, B Sc (Agrn) Do do

136 Agricultural Demonstrator Mr K. Narayana Nayar, B Sc (Agrn) Do do

PUNJAB RESEARCH SCHEMES

(i) *Botanical Scheme*

137 Cotton Research Botanist Mr Mohd Afzal B Sc (Agrn.) (Punjab) Research Student, Indian Central Cotton Committee and State Research Scholar On deputation from Punjab Department of Agriculture

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st, 1936—*contd*

PUNJAB RESEARCH SCHEMES—*contd*

(i) *Botanical Scheme—contd*

			On deputation from Punjab Department of Agriculture,
138.	Assistant to Cotton Research Botanist	Chaudhri Mohammad Akbar, L Ag	
139.	Agricultural Assistant	Bh Sarup Singh L Ag. M Sc (Texas) U S A	Do do
140.	Agricultural Assistant	Th Rambar Singh B Sc (Agri)	Do. do.
141.	Agricultural Assistant	S Kehr Singh, B Sc (Agri)	Do. do.
142.	Agricultural Assistant	Bh Antar Singh, B Sc (Agri)	—
143.	Agricultural Assistant	Bh Santokh Singh, B Sc (Agri)	On deputation from Punjab Department of Agriculture.
144.	Agricultural Assistant	S Fateh Ali Shah, B Sc (Agri)	Do do.

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145.	Agricultural Assistant	Ch Hanadu Ram, B Sc (Agri) Gold Medalist	—
146.	Agricultural Assistant (B Class)	Mr S E Danial, L C (Course)	On deputation from Punjab Department of Agriculture
147.	Technical Assistant	Ch Mohammad Rashid Khan L C Course, Munshi Fazal, F A (Punjab University)	Do do.
148.	Statistical Assistant	Mr Bhagat Ram Sehgal, M A (Punjab)	—
149.	Assistant Cotton Entomologist	(ii) <i>Entomological (Pink and Spotted Boll worm) Scheme</i> Mr M Haroon Khan, B Sc (Hons) (London), A R C S (London)	—

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEE'S FUNDS AS ON AUGUST 31st 1936—*contd*

PUNJAB RESEARCH SCHEMES—*contd*

(ii) *Entomological (Pink and Spotted Boll worm) Scheme—contd*

150	Field Assistant Research Work	Mr Lalha Ram B Sc	—	
151	Field Assistant Research Work	L Gan la Ram B Sc F E L	—	
152	Field Assistant Research Work	Mr Piare Mohan, B Sc (Hons) M Sc	—	
153	Field Assistant Research Work	Mr Manzoor Abbas B Sc (Agr)	—	
154	Field Assistant Research Work	Mr Ghulam Ullah, B Sc (Agr)	—	
155	Research Assistant	Mr Abdul Gham B Sc (Agr)	—	
156	Research Assistant	Mr Dharm B r Kohli B Sc (Agr)	—	
		(iii) <i>White Fly Scheme</i>		
157	Assistant Cotton Entomologist	L Kedar Nath Trehan M Sc (Punjab)	Research Student Cotton Committee	Indian Central
158	Field Assistant	Mr Hari Chand B Sc (Agr)	—	
		(iv) <i>Root Rot Scheme</i>		
159	Assistant Cotton Mycologist	Dr R S Vasudeva B Sc Ph D (London) D I C (London)	—	
160	Agricultural Assistant	Mr Mohd Ashraf B Sc (Agr)	—	
161	Agricultural Assistant	Ch Mohd Rafiq M Sc (Hons)	—	

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31st, 1936—*cont'd*

PUNJAB RESEARCH SCHEMES—*concl'd*

(v) *Physiological (Periodic Partial Failure) Scheme*

		On deputation from Bombay Educational Department
162	Plant Physiologist	Prof R H Dastur M Sc, FLS
163	Assistant Physiologist and Microscopist	Dr S S Verma M Sc (Benares) Ph D (London) D I C
164	Bio Chemist	Dr K M Samant M Sc Ph D
165	Chemical Assistant	Mr A A Ahad, B Sc (Agri)
166	Physiological Assistant	Bh Sucha Singh, B Sc (Agri)
167	Statistical Assistant	Mr Kanwar Kishan M A (Punjab)
168	Field Assistant	Bh Mukhtar Singh, B Sc (Agri)

UNITED PROVINCES, KOLKATA AND BUNDELKHAND SURVEY SCHEME

169	Agricultural Inspector	Mr Attar Singh, L Ag (Cawnpore)	On deputation from the United Provinces Department of Agriculture
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HYPHABAD RESEARCH SCHEMES

(i) *Botanical Scheme*

170	Cotton Research Botanist	Rai Sahib Kalidas Sawhney M Sc (Punjab)	Late Cotton Breeder in the Department of Agriculture, Iraq, Baghdad
171	Assistant Cotton Research Botanist	Mr D V Narayanaya Dip Agri (Poona)	On deputation from Bombay Department of Agriculture
172	Assistant Cotton Research Botanist	Mr A K Bederker, B A (Madras), B Ag (Bombay)	On deputation from H E H the Nizam's Department of Agriculture.
173	Inspector Variety Testing Stations	Mr V R Yardi, B Ag (Bombay)	—

HYDERABAD RESEARCH SCHEMES—*contd*

(11) *Hyderabad (Pink and Spotted Boll worm) Scheme*

174	Cotton Entomologist	Mr H D Nangpal M Sc (Punjab)	Research Cotton Committee and Entomologist United Provinces	Indian Central Assistant	Pink Boll worm Scheme
175	Senior Research Assistant	Mr N T Nadkarny B Ag (Bombay) Post Graduate Course in Entomology at Poona Agricultural College			---
176	Junior Research Assistant	Mr T E Krishnaswamy B Sc (Agriculture) (Coimbatore)			---

HYDERABAD SPIN DISTRIBUTION SCHEME

177	Inspector	Mr M V Chinnai			---
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BARONA RESEARCH SCHEMES

(1) *Root Rot Scheme*

178	Cotton Breeder	Mr M S Pandya B Ag (Bombay) B Sc	On deputation from Bombay Department of Agriculture		
179	Breeding Assistant	Mr A F Patel, B Ag (Bombay)			---
180	Mycological Assistant	Mr G H Desai B Ag (Bombay)			---
181	Field Assistant	Mr V G Kulkarni			---
182	Field Assistant	Mr M C Patel			---

LIST OF SCIENTIFIC AND TECHNICAL OFFICERS PAID FROM THE INDIAN CENTRAL COTTON COMMITTEES FUNDS AS ON AUGUST 31ST 1936—*contd*

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BARODA RESEARCH SCHEMES—*contd*

(1) *Plant Pulver Propaganda Scheme*

183	Plant Pulver Officer	Mr I M Desai B A	—
184	Plant Pulver Propagandist	Mr R S Patel	—

BHEANER GANG CANAL SCHEME

185	Cotton Assistant	Mr Arjan Singh B Sc	—
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BENGAL COMILLA COTTON SCHEME

186	Cotton Research Officer	Mr H K Majumdar M Sc	—
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MYSORE (DODDAKATHI) SCHEME

187	Junior Assistant Botanist	Mr K Gopal Iyengar M Sc (Bombay)	—
188	Junior Assistant	Mr G Srinivas Iyengar M Sc (Mysore)	—

TECHNOLOGICAL ASSISTANTS PAID BY INDIAN CENTRAL COTTON COMMITTEE

			Research Cotton Committee	Student Cotton Committee	Indian Central Cotton Committee
189	Under Cotton Specialist Consultant	Mr R L N Iyengar B Sc	Research Cotton Committee	Student Cotton Committee	Indian Central Cotton Committee
190	Under Cotton Breeder Director	Mr H R Nayak Inter Science (Madras)	Formerly Junior Tester at Technological Laboratory Bombay		
191	Under Cotton Research Botanist Junior	Mr S Raja Raman B A (Madras) M Sc (Benares)			
192	Under Deputy Director of Agriculture (University)	Mr Srinagobalana B Sc (Mysore)	Research Cotton Committee	Student Cotton Committee	Indian Central Cotton Committee
193	Under Botanist Agricultural Research Station, Madras	Mr K S Marar B A LL B	Formerly Junior Tester at Technological Laboratory Bombay		

APPENDIX XVI

RESEARCH STUDENTSHIPS

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1923	Sohan Singh Bindra, M Sc Honours School (Punjab)	Lyalpur	Cotton Entomology	Punjab Agricultural Department Cotton Botanist	Late Assistant Entomologist Pink Bollworm Research Scheme, Punjab Recently in Agricultural Department, Kenya
"	Mohammed Afzal, B Sc (Punjab)	Do	Cotton Botany (Plant Breeding)	Punjab Agricultural Department Cotton Botanist	Indian Central Cotton Committee
"	Sheo Shankar Pande, M Sc (Punjab)	Nagpur	Do	Punjab Botanical Research Scheme Assistant to Economic Botanist for Cotton	Do
"	Jiwan Singh M Sc (Punjab)	Do	Cotton Mycology	Central Provinces Botanical Research Scheme Reader in Botany, Khalsa College, Amritsar	Late Senior Mycological Assistant, Central Provinces Wilt Investigation Scheme
"	Habanto Banerji, M Sc (Calcutta)	Combatore	Cotton Botany	University Lecturer in Botany, Calcutta University, from 31st January 1929	Held a Senior Research Studentship under Dr M A Sampath kumaran M A, Ph.D. Central College, Bangalore, and at the Institute of Plant Industry Indore, from April 1926 to March 1928

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1923	B B D-mai B Ag (Bom day)	Dharwar	Cotton Botany	Sind Agricultural Department Cotton Breeder Sind Mirpurkhas	Held a Senior Research Studentship at the Institute of Plant Industry, Indore, from July 1926 to June 1927
1924	Atul Chandra Dutta M Sc (Calcutta)	Calcutta	Do	Lecturer in Botany Cotton College Gauhati Assam	
	N Han Rao M Sc (Calcutta)	Technological Research Laboratory Matunga Bombay	Textile Physics	Senior Research Assistant (Physicist) Technological Research Laboratory Matunga Bombay	Indian Central Cotton Committee
	H D Nanangopal M Sc (Bom day)	Calcutta	Cotton Entomology	Entomologist Hyderabad Link and Spotted Boll worm Scheme, Parbhani	
	Govt. Laladhar M Sc (Bom day)	Surat	Cotton Physics		Late Special Research Assistant, Pink Boll worm Investigation United Provinces Resigned in August 1924 to go to Carn bridge for further study Obtained Ph D
1925	A Jee Rao M Sc (Bom day)	Calcutta	Cotton Entomology	United Provinces Subordinate Agricultural Service	Late Research Assistant under the Entomologist to Government United Provinces—Pink Boll worm Investigation Scheme
	Akbar Ali B Sc (Bom day)	Bombay	Cotton Botany (Plant Breeding)	Punjab Agricultural Department Assistant Punjab Botanical Research Scheme	Indian Central Cotton Committee

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APPENDIX XVI

RESEARCH STUDENTSHIPS

Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1923	Sohan Singh Bindra, M Sc Honours School (Punjab)	Lyalpur	Cotton Entomology		Late Assistant Entomologist, Pink Bollworm Research Scheme, Punjab Recently in Agricultural Department, Kenya
"	Mohammed Afzal, B Sc (Punjab)	Do	Cotton Botany (Plant Breeding)	Punjab Agricultural Department Cotton Research Botanist Punjab Botanical Research Scheme Assistant to Economic Botanist for Cotton Central Provinces Botanical Research Scheme	Indian Central Cotton Committee
"	Sheo Shankar Pande, M Sc (Punjab)	Nagpur	Do	Assistant to Economic Botanist for Cotton Central Provinces Botanical Research Scheme	Do
"	Jiwan Singh, M Sc (Punjab)	Do	Cotton Mycology	Reader in Botany, Khalsa College, Amritsar	Late Senior Mycological Assistant, Central Provinces Wilt Investigation Scheme
"	Nabanto Banerji, M Sc (Calcutta)	Combatore	Cotton Botany	University Lecturer in Botany, Calcutta University, from 31st January 1929	Held a Senior Research Studentship under Dr M A Sampathkumaran, M A, Ph D, Central College, Bangalore, and at the Institute of Plant Industry, Indore, from April 1926 to March 1928

RESEARCH STUDENTSHIPS—contd

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Name.	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
"	M S Technological Research Laboratory Matunga Bombay	Textile Physics	Senior Research Assistant (Physicist) Technological Research Laboratory, Matunga, Bombay	Indian Central Cotton Committee
"	Secret	Cotton Physiology	Sind Agricultural Department, Senior Assistant to Agricultural Chemist and Soil Physicist, Sakrand	Awarded a Training Grant for foreign study in 1933
"	Jalpur	Cotton Entomology		Resigned in July 1937
"	ombatore	Cotton Biochemistry	Chemist and Agronomist Institute of Plant Industry Indore	Indian Central Cotton Committee
"	Institute of Plant Industry Indore	Cotton Botany	Sind Agricultural Department Cotton Supervisor Indus Right Bank, Sind Seed Distribution Scheme, Dadu	Do
"	Do	Do	Assistant Farm Superintendent, Institute of Plant Industry, Indore	Do.
"	Do	Cotton Technology	Technological Assistant Coimbatore	Do
"	Technological Research Laboratory Matunga Bombay	Cotton Biochemistry	Assistant Chemist Indian Lao Research Association	Do
"	Institute of Plant Industry, Indore	Cotton Entomology		Secured Government Scholarship for study abroad and obtained Ph D (Contab)
"	Anant Krishna Thakur, M S (Bombay)			
"	Dev Raj Mehta, M S (Honore School (Punjab))			

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How, now employed	Remarks
1925	K. Dar Nath Trehan (Punjab)	Lyallpur	Cotton Entomology	Punjab Agricultural Department Assistant Cotton Entomologist White Fly Investigation Scheme, Punjab	Held Senior Research Studentship for study of "White Fly", problem at Khanawal Indian Central Cotton Committee
"	S. E. Kumana, B.A., M.Sc. (Bombay)	Technological Research, Labor story, Matunga Bombay	Cotton Technology		Technological Assistant, Dharwar, up to 31st July 1929. Went abroad for further study
"	J. D. Ranadive B.A. (Bombay)	Dharwar	Cotton Mycology	Pathological Assistant Cotton Breeding Scheme Jalgaon, Khandesh	Indian Central Cotton Committee
"	P. K. Roy, M.Sc. (Dacca)	Technological Research, Labor story, Matunga Bombay	Textile Physics		Resigned in July 1925
"	K. R. Sen M.Sc. (Dacca)	Do	Do	Technological Assistant Lyallpur	Indian Central Cotton Committee Obtained a Doctorate (D.Sc.) in 1934
"	L. N. Rao, M.Sc. (Calcutta)	Do	Cotton Microscopy	Lecturer in Botany Central College, Bangalore	Resigned in August 1928
1928	D. F. Kapadia, B.A. (Bombay), M.Sc. (Tech.) (Manchester)	Do	Cotton Technology	Head of the Textile Manufactures Department Victoria Jubilee Technical Institute, Bombay	Late Senior Research Assistant, Assistant Technologist, Technological Research Laboratory, Matunga Bombay

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1926	Ram Saran Kishia (Punjab)	Technological Research Laboratory Matunga, Bombay	Textile Physics	Senior Research Assistant (Physicist), Technological Research Laboratory, Matunga, Bombay	Indian Central Cotton Committee
"	M. A. Shama Iyengar, B. Ag. (Bombay)	Surat	Cotton Physiology	Sind Agricultural Department, Senior Assistant to Agricultural Chemist and Soil Physicist Sakrand	Awarded a Training Grant for foreign study in 1933
"	Karam Singh Lamba, B.Sc. Honours (Punjab)	Lyalpur	Cotton Entomology	Chemist and Agronomist, Institute of Plant Industry Indore	Resigned in July 1927
"	V. D. Wad, M.A. B.Sc. (Bombay) A.I.I.S.C.	Coimbatore	Cotton Biochemistry	Sind Agricultural Department, Cotton Supervisor Indus Right Bank, Sind	Do
"	M. A. Iyengar, B. Ag. (Bombay)	Institute of Plant Industry Indore	Cotton Botany	Seed Distribution Scheme, Dadu	Do
"	S. C. Talwar, B. Ag. (Bombay)	Do	Do	Assistant Farm Superintendent, Institute of Plant Industry, Indore	Do
1927	B. Lakshminarasimha Iyer, B.Sc. (Madras)	Technological Research Laboratory, Matunga, Bombay	Cotton Technology	Technological Assistant Coimbatore	Do
"	Anant Krishna Thakur, M.Sc. (Bombay)	Institute of Plant Industry Indore	Cotton Biochemistry	Assistant Chemist, Indian Lac Research Association	
"	Dev Raj Mehta, B.Sc. Honours (Punjab)	Lyalpur	Cotton Entomology		Secured Government scholarship for study abroad and returned in 1930 (M.A. in B. (Agriculture))

RESEARCH STUDENTSHIPS—contd

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Uma Shankar, M Sc (Allahabad)	Cawnpore	Cotton Entomology	Asst Professor of Zoology and Entomology, Agricultural College, Cawnpore	Obtained Doctorate at Edinburgh
"	Shripad Shamrao Rane, M Sc (Benares Hindu University)	Institute of Plant Industry, Indore	Cotton Physiology	Unemployed	Awarded a Foreign Scholarship by the Indian Central Cotton Committee
"	Sant Singh Verma, M Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Wilt Investigation		Obtained Ph D (Lond)
"	Lakshmi Narayan Mathur M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Breeding	Crop Botanist, Ujjain, Gwalior Department of Agriculture	
"	Kadaba Rangaswamy, M Sc (Calcutta)	Combatore	Do	Unemployed	
"	S Shamsar Singh, M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Agronomy	Agricultural Officer Bikaner State	
1928	K Dharmarajulu, M Sc (Bombay)	Dharwar	Cotton Mycology	Assistant Botanist, Madras Pemphera and Physiological Scheme	Indian Central Cotton Committee
"	Piara Mohan, B Sc. Honours School (Punjab), M Sc	Cawnpore	Cotton Entomology	Field Assistant, Parasite Work Pink and Spotted Boll worm Scheme, Punjab	Do
"	R N Qidwai, B Ag (Bombay)	Surat	Cotton Agronomy	Sind Agricultural Department, Inspector of Agriculture, Eastern Naras Circle, Murpurkhas	...
"	M Kanti Raj, M A, B Sc (Agriculture) (University of Madras)	Institute of Plant Industry, Indore	Do	Madras Agricultural Service	
"	C. Nanjundayya, M Sc (Calcutta)	Research Laboratory, Matunga Bombay	Cotton Technology	Junior Research Assistant, Technological Research Laboratory, Matunga, Bombay	Indian Central Cotton Committee

RESEARCH STUDENTSHIPS—contd.

Year of appointment.	Name.	Where posted on appointment.	Branch of Cotton Research in which scholarship granted.	How now employed.	Remarks.
1929	Sringabhubhavana, B.Sc.	Technological Research Laboratory, Matunga, Bombay.	Technological.	Technological Assistant, Surat.	Indian Central Cotton Committee.
3	Dhai Pratap Singh Bhullar, B.Sc. (Agri.) (Punjab).	Lyalpur ..	Cotton Marketing and Economics.	Punjab Agricultural Department.	....
"	Dhai Aljab Singh Gultzar, B.Sc. (Agri.) (Punjab).	Do. ..	Do. ..	Do. ..	....
1930	Madan Lal Bhatia, M.Sc. (Punjab).	Do. ..	Entomology ..	Abroad for further study ..	....
"	Bholu Nath, M.Sc. (Punjab) ..	Institute of Plant Industry, Indore.	Cyctology and Plant Breeding.	Genetical Assistant, Institute of Plant Industry, Indore.	Indian Central Cotton Committee.
"	Pran Nath Mehra, M.Sc. Sahrand (Punjab).	..	Do. ..	....	Resigned.
"	Pranjendra Nath Dhargava, M.A. (Lucknow).	Lucknow ..	Cotton Marketing and Economics.	....	....
1931	B. S. Shringiti, B.Ag. (Bombay).	Surat, Gujarat ..	Do. ..	....	Resigned.
"	K. R. Dube, B.Ag. (Nagpur).	Nagpur ..	Do. ..	Dist. Supervisor, Enquiry into the cost of production of Cotton and Sugar-cane crops, Central Province.	....
"	Santokh Singh Jaggi, B.Sc. (Agri.) (Punjab).	Lyalpur ..	Do. ..	Agricultural Assistant, Punjab Botanical Research Scheme.	Indian Central Cotton Committee.
"	Doraiwami Ayyar, B.A., B.Sc. (Agri.) (Madras).	Madras ..	Do. ..	Madras Agricultural Service.	....
1935	Krishna Bhari Lal, M.Sc. (Cal.), Ph.D. (Edinburgh)	Lyalpur ..	Cotton Entomology	Research Student ..	Under training.
1936	M. U. Parmar, M.Sc. (Bombay).	Technological Research Laboratory, Matunga, Bombay.	Cotton Technology	Research Student.	Under training
"	G. Rama Rao, B.Sc. (Bombay)	Do. ..	Do. ..	Do. ..	Do.

RESEARCH STUDENTSHIPS—*contd.*

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed	REMARKS
1927	Uma Shankar, M Sc (Allahabad)	Cawnpore	Cotton Entomology	Assist Professor of Zoology and Entomology, Agricul- tural College, Cawnpore	Obtained Doctorate at Edinburgh
"	Shripad Shamrao Rane, M Sc (Benares Hindu University)	Institute of Plant Industry, Indore	Cotton Physiology	Unemployed	...
"	Sant Singh Verma, M Sc (Benares Hindu University)	Dharwar	Cotton Physiology in connection with Cotton Wilt Investigation		Awarded a Foreign Scholarship by the Indian Central Cotton Committee
"	Lakshmi Narayan Mathur, M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Breeding	Crop Botanist, Ujjain, Gwalior Department of Agriculture	Obtained Ph D. (Lond)
"	Kadaba Rangaswamy, M Sc (Calcutta)	Coimbatore	Do	Unemployed	...
"	S Shamser Singh, M Sc (Punjab)	Institute of Plant Industry, Indore	Cotton Agronomy	Agricultural Officer, Bikaner State	...
1928	K Dharmarajulu, M Sc (Bombay)	Dharwar	Cotton Mycology	Assistant Botanist, Madras	Indian Central Cotton Committee
"	Pare Mohan, B Sc, Honours School (Punjab), M Sc	Cawnpore	Cotton Entomology	Fempheries and Physiological Scheme	Do.
"	R N Gulwan, B Ag (Bombay)	Surat	Cotton Agronomy	Field Assistant, Parasite Work, Pink and Spotted Boll worm Scheme, Punjab	....
"	M Kanta Raj, M A, B Sc (Agr) (University of Edin.)	Institute of Plant Industry, Indore	Do	Siml Agricultural Department, Inspector of Agriculture, Eastern Naracircle, Murpurkhas	..
"	C. Nanjundayya, M Sc (Calcutta)	Research Laboratory, Matunga, Bombay	Cotton Technology	Madras Agricultural Service	Indian Central Cotton Committee
"				Junior Research Assistant, Technological Research Laboratory, Matunga, Bombay	

RESEARCH STUDENTSHIPS—continued

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed.	Remarks
1929	Pringabhabana B Se	Technological Research Laboratory Matunga Bombay	Cotton Technology	Technological Assistant Surat	Indian Central Cotton Committee
3	1. Lal Pratap Singh Bhullar B Se (Agri) (Punjab)	Lyallpur	Cotton Marketing and Economics	Punjab Agricultural Department	
	Bhal Aja Singh Gulzar B Se (Agri) (Punjab)	Do	Do	Do	
1930	Mahlan Lal Bhatia M Se (Punjab)	Do	Entomology	Abroad for further study	
	Dola Nath M Se (Punjab)	Institute of Plant Industry Indore	Cytology and Plant Breeding	Geobotanical Assistant Institute of Plant Industry Indore	Indian Central Cotton Committee
	Fran Nath Mehra M Se (Punjab)	Sakrand	Do		Resigned.
	Brajendra Nath Bhargava M A (Lucknow)	Lucknow	Cotton Marketing and Economics		
1931	B S Bhatnagar B Ag (Bombay)	Surat Gujarat	Do		Resigned.
	K. R. Dube B Ag (Nagpur)	Nagpur	Do	Asst Supervisor Enquiry into the cost of production of Cotton and Sugar-cane crops, Central Provinces.	
4	Santosh Singh Jaggi B Se (Agri) (Punjab)	Lyallpur	Do.	Agricultural Assistant Punjab Botanical Research Scheme Madras Agricultural Service	Indian Central Cotton Committee
1935	Dorneswami Ayyar B A. Madras	Madras	Do		
	Krishna Narayan Lal M Se (Cal)	Lyallpur	Cotton Entomology	Research Student	Under training
1936	M U Iqbal M Se (Bombay)	Technological Research Laboratory Matunga, Bombay.	Cotton Technology	Research Student.	Under training
2	G Rama Rao B Se (Bombay)	Do	Do	Do.	Do

RESEARCH STUDENTSHIPS—*concl'd*

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Year of appointment	Name	Where posted on appointment	Branch of Cotton Research in which scholarship granted	How now employed.	REMARKS
1931	Sant Singh Verma, M Sc (Benares Hindu University)	Imperial College of Science and Technology, London	Foreign Research Studentships off Plant Physiology		Completed training, July 1935 Obtained Ph D of London University
1933	S N Venkataramanan, B A., B Sc (Agr.) (Madras)	Calcutta	Training Grants Cotton Statistics	Madras Agricultural Service	....
"	C Jagannatha Rao, B A (Madras)			Research Student	Under training
1936	P Abraham, B A (Madras)			Not yet joined	....
1933	M Taskhur Ahmad, B Sc (Agr.) (Punjab)	Foreign Training Grants Trinity College, Cambridge	Cotton Phynology Cotton Cytology Cotton Training Grants Entomology	Assistant Entomologist, Imperial Institute of Agricultural Research, Pusa	....
"	G B Patel, B Ag (Bombay)	University of California, U S A	Cotton Breeding	Research Student	Completed training July 1936 Obtained M Sc of California University
1934	M A Shama Iyengar, B Ag (Bombay)	Tour in Hungary, England and Egypt	Study of Kalar (al kah) lands and cultivation of superior Egyptian cottons with special reference to soil and environmental conditions	Sind Agricultural Department Senior Assistant to Agricultural Chemist and Soil Physicist	
"	Nazir Ahmad, M Sc (Punjab)	Imperial College of Science and Technology, London	Entomology	Research Student	Under training
1936	Kidar Nath Trehan M Sc (Punjab)	"	Applied Entomology	Not yet joined	....

"Indian Central Cotton Committee" in the remarks column indicates a post paid for from one of the Committee's Research Grants

